

**CLARK FORK RIVER  
MACROINVERTEBRATE COMMUNITY BIOINTEGRITY:  
2001 ASSESSMENTS**

prepared for  
**Montana Department of Environmental Quality  
Planning, Prevention and Assistance Division**

prepared by  
**Daniel L. McGuire  
McGuire Consulting**

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## SUMMARY

The Montana Department of Environmental Quality has conducted annual macroinvertebrate surveys in the Clark Fork River Basin since 1986. Each August, we assess biological integrity to evaluate water quality at 25 to 28 sites from the headwaters to Thompson Falls Reservoir. Our analysis was developed specifically for the Clark Fork River drainage and compares each station to a fixed reference condition. The analysis integrates ten measures of macroinvertebrate structure and function into a single index of biological integrity. In addition, metric subsets estimate the relative severity of metals and nutrient/organic pollution. In this report, the 2001 data are analyzed and temporal trends are evaluated. A detailed picture of environmental health and water quality trends over the past 16 years is presented.

**Long-term monitoring** indicates widespread pollution, but generally improving water quality, in the Clark Fork River drainage. Prior to 1993, biological integrity was impaired at most study area sites. Post-remediation monitoring (1993 to present) indicates significant improvements in water quality at most sites. On a scale of 0 to 100% (with values greater than 90% indicating nonimpairment), individual site assessments have ranged from 13 to 98%. Biointegrity was lowest and severely impaired in upper Silver Bow Creek. Benthic assemblages were much healthier below the Warm Springs Ponds and biointegrity in the upper Clark Fork River was usually classified as slightly (90 to 70%) or moderately (70 to 50%) impaired. Downstream from the Little Blackfoot River, the Clark Fork River was generally slightly impaired. High biointegrity scores indicated excellent water quality in the Little Blackfoot River, Rock Creek, and the Blackfoot River.

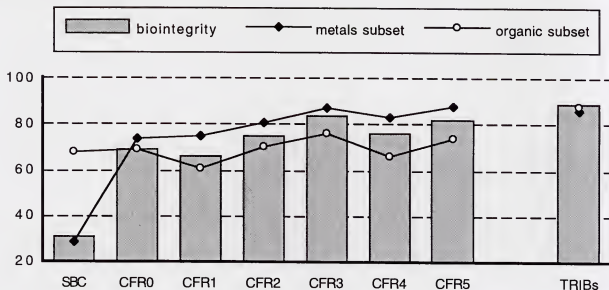
**Nutrient and organic pollution** are the principle cause of biological impairment in most of the Clark Fork River Basin. Nutrient and organic pollution generally suppress biointegrity throughout the Clark Fork mainstem and in the lower reaches of Flint Creek and the Bitterroot River. Impacts to the benthic community are usually slight. However, severe impacts are sometimes detected in Silver Bow Creek below the Butte municipal wastewater treatment outfall. The Butte WWTP effluent is a major nutrient source for Silver Bow Creek, the Warm Springs Ponds and the Clark Fork River. Increased nutrient/organic pollution is also evident in the Clark Fork River near Deer Lodge and, prior to 1999, from the confluence of the Bitterroot River to Huson. Impacts in the Deer Lodge Valley are primarily attributable to nutrients from nonpoint sediment sources and upstream WWTPs and are accentuated by low summer stream flows. Impacts in the lower river are attributed to nutrients from upstream sources, the Missoula WWTP, the Bitterroot River, the Stone Container kraft mill, and groundwater. Diminished impacts in this reach indicate significantly reduced nutrient loads during the past 3 years.

**Metals pollution** has been indicated in the Clark Fork Basin from Butte to Missoula during the past 16 years. The degree of metals impairment has varied both spatially and temporally. Severe impacts were evident in upper Silver Bow Creek on all dates. Prior to 1993, slight metals pollution was usually detected in the Clark Fork from the Warm Springs Ponds downstream to the confluence of Rock Creek and occasionally indicated as far downstream as Missoula. Since 1993, impacts attributable to metals have diminished in the Clark Fork mainstem and have usually been limited to slight impacts from Deer Lodge to the confluence of the Little Blackfoot River (CFR1). However, metals pollution was more widespread in the Clark Fork River during 1997 when metals caused moderate biological impairment in the lower Deer Lodge Valley and slight impairment downstream to Turah (CFR1-3). Increased metals pollution was attributable to elevated metals loading associated with higher peak flows in 1997.

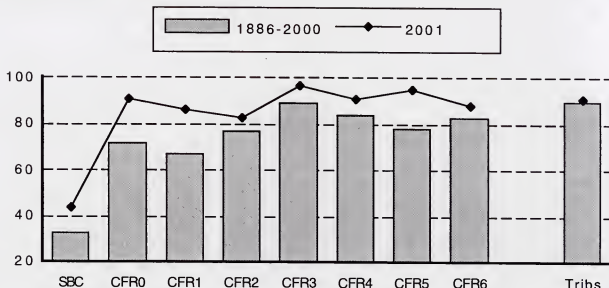
Biological integrity has improved at 7 stations in the upper basin since 1993. Significant improvement is evident in Silver Bow Creek, Mill-Willow Bypass, Warm Springs Creek, and in the Clark Fork River from Warm Springs Creek downstream to Sager Lane (CFR0). Improved biointegrity at these sites is primarily attributable to a reduction in metals pollution that coincided with remediation activities at the Warm Springs Ponds, in the Mill-Willow creeks bypass channel, in the Warm Springs Creek drainage and the upper few miles of the Clark Fork River. Recent biological monitoring indicates that water quality declines in the Clark Fork River as it passes through the Deer Lodge Valley.

Benthic macroinvertebrate assemblages were relatively healthy throughout the Clark Fork Basin **during 2001**. However, pollution was evident at 13 of 28 monitoring stations. Upper Silver Bow Creek remained severely impaired by metals, nutrient, and organic pollution. Only minor reductions in biological integrity were indicated elsewhere in the basin. Slight biological impairment attributable to nutrient/organic pollution was evident in Silver Bow Creek below the Warm Springs Ponds, in Flint Creek, and the Clark Fork River from Deer Lodge to the Little Blackfoot River. Unlike previous years, significant nutrient pollution was not indicated in any Clark Fork River station from the Little Blackfoot River downstream to Superior. This may reflect a significant nutrient load reduction and coincides with the recent shift to land application of effluent from the Deer Lodge treatment lagoon. Slight impairment from nutrients was indicated in the Clark Fork above the Flathead River. Slight metals pollution was also indicated in Blacktail Creek and in the Clark Fork River at Deer Lodge. However, for the second straight year, metals-related impacts were not detected at any other site on the Clark Fork River. Overall, the Clark Fork River Basin appeared to be healthier in 2001 than at any time since monitoring began in 1986.

Mean biointegrity (%) in Clark Fork River Basin stream reaches during August, 1986-2001. Metals and organic scores based on metrics considered most sensitive to each type of pollution.

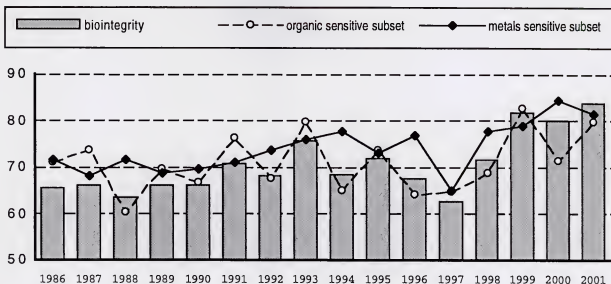


Mean biointegrity (%) in Clark Fork River Basin stream reaches during August, 1986-2000 and 2001.

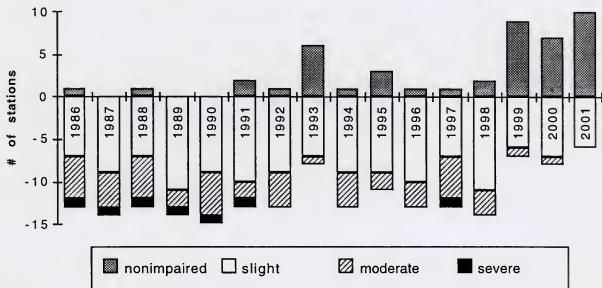


Stream reaches: SBC = Upper Silver Bow Creek, CFR0 = Warm Springs Ponds to Sager Lane, CFR1 = Deer Lodge to Little Blackfoot River, CFR2 = Little Blackfoot River to Rock Creek, CFR3 = Rock Creek to the Blackfoot River, CFR4 = Milltown dam to the Bitterroot River, CFR5 = Bitterroot River to Alberton, CFR6 = Alberton to the Flathead River, Tribs = Warm Spring Ck., Little Blackfoot R., Flint Ck., Rock Ck., Blackfoot R., and Bitterroot R.

Mean biointegrity (%) in the Clark Fork River Basin during 16 years of monitoring (20 stations; 80 samples per year). Metals and organic scores based on metrics considered most sensitive to each type of pollution.



Biointegrity impairment classifications for stations in the Clark Fork River from the Warm Springs Ponds to the Flathead River, 1986 through 2001 (14 to 16 stations per year).



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## 1. INTRODUCTION

The Montana Department of Environmental Quality (MDEQ) conducts annual macroinvertebrate surveys as part of its environmental surveillance of the Clark Fork River Basin. In 1986, the program expanded from a water quality study of the lower Clark Fork River (Ingman 1985) to include biological monitoring throughout the basin. Macroinvertebrates are collected from 28 stations along a 300-mile reach from Silver Bow Creek to Thompson Falls Reservoir. Data from 2001 are presented in this report.

Macroinvertebrates are good indicators of water quality and are commonly used to evaluate environmental impacts to streams. Healthy streams support diverse assemblages of mayflies (Ephemeroptera), stoneflies (Plecoptera), caddisflies (Trichoptera), true flies (Diptera), beetles (Coleoptera) and many others. These organisms provide energy pathways from primary producers (algae) and organic material to consumers (fish, humans, etc.). As integral components of stream ecosystems, macroinvertebrate assemblages reflect the cumulative impacts of all pollutants. Toxic substances, organic pollution, and excessive sediment loading produce characteristic changes in the macroinvertebrate community. These responses can be used to document the type(s) and degree of pollution.

Macroinvertebrate-based assessments can be used to quantify ecosystem health or, its converse, environmental degradation. Biointegrity has been defined as "the capacity of supporting and maintaining a balanced, integrated, adaptive community having species composition diversity and functional organization comparable to that of natural habitat of the region" (Karr and Dudley 1981). This concept has been refined to incorporate both ecological integrity and human values by Meyer (1997) who describes a healthy stream as "an ecosystem that is sustainable and resilient, maintaining its ecological structure and function over time while continuing to meet societal needs and expectations".

The analysis used in this report was specifically developed for the Clark Fork River Basin. Annual evaluations of aquatic ecosystem health are made at 25 to 28 sites and longitudinal and temporal trends are evaluated (McGuire 1987, 1989a, 1989b, 1993, 1995, 1997-2001; McGuire and Ingman 1996). With the inclusion of the 2001 data, a 16-year database exists for 20 stations. Eight other sites have been monitored for at least 7 years.

**Figure 1**  
**Clark Fork Basin**  
**Monitoring Project**

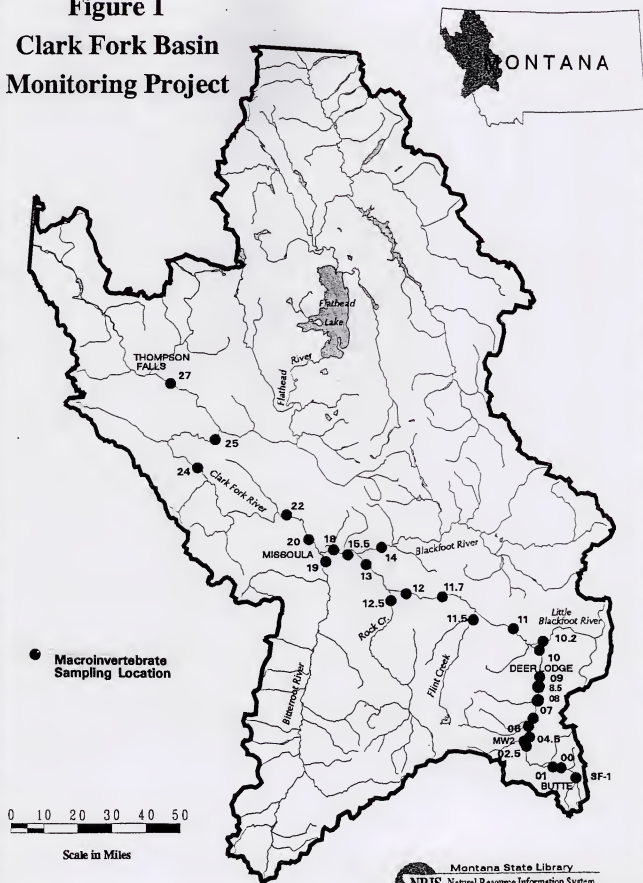


Table 1. Clark Fork Basin biomonitoring sites.

station	name	reach	period of record
SF-1	Blacktail Creek above Grove Gulch		1993 - 2001
00	Silver Bow Creek above Butte WWTP	SBC	1987 - 2001
01	Silver Bow Creek at Rocker	SBC	1986 - 2001
02 *	Silver Bow Creek near Ramsay	SBC	1986 - 1992
02.5	Silver Bow Creek at Opportunity	SBC	1993 - 2001
03 *	Silver Bow Creek above Warm Springs Ponds	SBC	1986 - 1992
04 *	Warm Springs Pond #2 discharge		1986 - 1991
04.5	Silver Bow Creek below Warm Springs Ponds	CFR0	1993 - 2001
MW-2	Mill-Willow Creeks Bypass		1986 - 1991, 1999 - 2001
06	Warm Springs Creek near mouth	TRIB	1986 - 2001
07	Clark Fork River below Warm Springs Creek	CFR0	1986 - 2001
08	Clark Fork River near Dempsey	CFR0	1986 - 1992, 1998 - 2001
08.5	Clark Fork River at Sager Lane	CFR0	1990 - 1992, 1998 - 2001
09	Clark Fork River at Deer Lodge	CFR1	1986 - 2001
10	Clark Fork River above Little Blackfoot River	CFR1	1986 - 2001
10.2	Little Blackfoot River near mouth	TRIB	1993 - 2001
11	Clark Fork River at Gold Creek Bridge	CFR2	1986 - 2001
11.5	Flint Creek at New Chicago	TRIB	1993 - 2001
11.7	Clark Fork River at Bearmouth	CFR2	1993 - 2001
12	Clark Fork River at Bonita	CFR2	1986 - 2001
12.5	Rock Creek near Clinton	TRIB	1993 - 2001
13	Clark Fork River at Turah	CFR3	1986 - 2001
14	Blackfoot River near mouth	TRIB	1986 - 2001
15 *	Clark Fork River below Milltown Dam	CFR4	1986 - 1988
15.5	Clark Fork River above Missoula	CFR4	1989 - 2001
16 *	Clark Fork River above Missoula WWTP	CFR4	1986 - 1988
18	Clark Fork River at Shuffield's	CFR4	1986 - 2001
19	Bitterroot River near mouth	TRIB	1986 - 2001
20	Clark Fork River at Harper Bridge	CFR5	1986 - 2001
22	Clark Fork River at Huson	CFR5	1986 - 2001
23 *	Clark Fork River near Alberton	CFR5	1986 - 1992
24	Clark Fork River at Superior	CFR6	1986 - 2001
25	Clark Fork River above Flathead River	CFR6	1986 - 2001
26 *	Flathead River near mouth		1986 - 1988
27	Clark Fork River above Thompson Falls Reservoir		1987 - 2001

\* discontinued stations

## **2. STUDY AREA**

The study area includes Silver Bow Creek, approximately 267 miles of the Clark Fork River, and the lower reaches of 9 tributaries (Figure 1). As in most years, 28 stations were sampled during 2001 (Table 1).

## **3. METHODS**

### **3.1 Field Work**

Since 1986, DEQ staff and/or Erich Weber and Dan McGuire have collected benthic organisms with a modified Hess sampler (0.1 sq. meter diameter, 1000 micron mesh netting). During August of each year, four replicate samples were obtained from each station. Sampling methods are described in the DEQ's Field Procedures Manual (1996). At each site, samples were obtained from the least embedded, most heterogeneous cobble substrates available. Aquatic and riparian habitat was evaluated at each site above Missoula. Nine parameters were visually rated using the MDEQ Rapid Bioassessment Protocol (RBP) field habitat assessment form.

### **3.2 Laboratory Analysis**

Laboratory processing was consistent with that used in previous years. Samples were rinsed in a U.S. Standard #30 sieve to remove the preservative. A small portion of the sample was placed in a white pan divided into ten equal areas by a grid. All macroinvertebrates were removed and sorted to order. This process was repeated until the entire sample was processed. If the sample clearly contained more than 1000 organisms, subsampling was used to estimate densities of selected abundant taxa (e.g. blackflies or hydropsychids). Samples were processed as usual except that selected taxa were removed from only two randomly selected grids. The number in the subsample was multiplied by five to provide estimated density per 0.1 m<sup>2</sup> Hess sample. Organisms were identified to the lowest level practical, usually genus or species, and enumerated.

### 3.3 Data Analysis

The analysis was specifically designed to evaluate water quality in the Clark Fork River Basin (McGuire 1993). The analysis incorporates 10 metrics (Table 2) into a single index of biological integrity. The metrics used in the analysis exhibit predictable responses to environmental stress and were the most suitable to the broad range of habitats within the study area. Each metric measured a different aspect of community composition, structure, or function. Since biological communities integrate the effects of all environmental stresses, this analysis provided a reliable evaluation of cumulative impacts from metals, nutrients, and streamflow alteration.

To evaluate stream health, each metric was assigned a score (0 to 6) based on its comparability to a reference value. Scores for all metrics were totaled and the sum, expressed as a percentage of the maximum possible score, was used as an estimate of biological integrity. The resulting summary score provides a reliable and easily understandable estimate of ecological health.

Metric scoring criteria reflect the range of values in the Clark Fork River Basin from 1986 through 1990. Data from the first three years (1986-1988) of the Clark Fork River Basin study and two years of data (1988-1989) from the Blackfoot River were used to establish metric scoring criteria. For each metric, statistically significant differences among stations were identified by one-way analysis of variance (McGuire 1987, 1989a, 1989b, 1990a, 1990b, Ingman et al. 1989, and unpublished data). Scoring criteria endpoints were defined by statistically distinct groups of stations with the highest and lowest scores. Nonimpaired endpoints were based on stations with the best metric scores and were generally established as the mean minus one standard deviation. On the lower end of the scale, endpoints were generally based on average values of the most severely impaired station(s).

Scoring criteria for some metrics were adjusted to improve the reliability of the assessment. The inclusion of Silver Bow Creek data resulted in wide scoring ranges for most metrics and, consequently, some statistical differences in metric values were not reflected in the scoring criteria. The lower end of the scoring criteria for taxa richness was truncated to provide better discrimination of slight impacts in the Clark Fork River at the expense of detecting slight improvements in Silver Bow Creek. Scoring criteria for percent filterers, Baetidae to Ephemeroptera, Hydropsychinae to Trichoptera, and EPT to EPTC ratio metrics were relaxed to improve the reliability of these metrics over the wide geographic area.

The biointegrity assessment sacrifices some sensitivity to subtle differences to improve reliability. In general, biological integrity in the Clark Fork Basin can be categorized as nonimpaired (90 to 100%), slightly impaired (70 to 90%), moderately impaired (50 to 70%), or severely impaired (<50%). These impairment classifications were less rigorous than statistical differences in the 1986 through 1988 Clark Fork River Basin data. Except for borderline values, scores in different narrative categories are considered significantly difference from one another.

Macroinvertebrate assemblages exhibit predictable responses to different types of environmental stress; consequently, the sensitivity of individual metrics varies with the type of pollution. Some parameters are useful as estimators of metals pollution while others are more sensitive to organic/nutrient enrichment, excessive sediment deposition, or partial dewatering. Both metals and nutrient pollution are known to degrade water quality and impact aquatic life in the Clark Fork Basin (Ingman and Kerr 1990, McGuire 1990). Therefore, subsets of metrics considered sensitive to these forms of pollution were used to estimate the relative severity of each pollutant (Table 2).

Impacts attributable to metals and nutrient/organic pollutants were estimated by the sum of scores for metrics in each subset, expressed as a percentage of the maximum possible score (usually 18). Metrics comprising the nutrient/organic subset were community density, biotic index, and the percent relative abundance of filter-feeding macroinvertebrates. The subset used to estimate metals pollution consisted of community density, EPT richness, and metals tolerance index.

A specific type of pollution was indicated when the score of one set of metrics was substantially lower than the other. To facilitate interpretation, impacts attributable to these pollutants were categorized as slight (~60 to 80%), moderate (~40 to 60%) or severe (< 40%). The more conservative classification scheme for these metric subsets reflects the limitations of an assessment based on only three metrics. The impairment classifications accurately reflect statistical differences in the 1986 through 1988 Clark Fork River Basin data. Except for borderline values, scores in different narrative categories were considered significantly difference from one another. Metrics and the rationale for their use are described as follows.

### Macroinvertebrate Density

Total macroinvertebrate density is an important feature of community structure and, when carefully interpreted, can be a useful indicator of several different environmental conditions. Unusually high or low macroinvertebrate densities are considered indicative of environmental perturbation. Macroinvertebrate density tends to increase in response to organic and/or nutrient enrichment, and the magnitude of the increase reflects the degree of the pollution. Conversely, macroinvertebrate density may be reduced by toxic substances such as metals, by severe habitat degradation, or by extensive scouring.

Low macroinvertebrate densities were used as an index of metals pollution in the upper Clark Fork River Basin. Specifically, this metric was included to document toxic impacts and provide a measure of biological improvement in Silver Bow Creek. Historically, macroinvertebrates have been absent from or present at very low densities in Silver Bow Creek and the Mill-Willow Bypass (Spindler 1959, Multitech and OEA Research 1986, McGuire 1990b). Increased macroinvertebrate abundance at these sites can be considered a clear indication of reduced toxicity. This metric typically provides little information regarding environmental health in the remainder of the study area.

High macroinvertebrate standing crops were included as a metric to assess nutrient and organic loading in the Clark Fork River. Densities greater than 2,000 per sample ( $0.1 \text{ m}^2$ ) were attributed to organic pollution and/or enhanced primary production caused by nutrient enrichment. Given that the threshold value is 2,000 organisms per sample, it is not considered a sensitive measure of organic loading in more oligotrophic tributaries. Because toxic conditions can preclude high macroinvertebrate densities (McGuire 1990b), this metric was not used to evaluate organic/nutrient pollution when density was less than 550 organism per sample. Densities between 550 and 2,000 organisms per sample received maximum scores for both metrics.

### Taxa Richness

Taxa richness, or the number of macroinvertebrate taxa per Hess sample, was probably the single best measure of environmental condition in the Clark Fork River drainage. It is a reliable measure of biological integrity because the loss of the most sensitive species to any stress affects the index. The range for scoring this metric was 14 to 40 taxa per sample. This truncated scoring range maximizes the sensitivity of this metric to small

reductions in taxa richness. Mean taxa richness in the lower Blackfoot River during 1988 and 1989 was 41 (Ingman et al 1990 and McGuire 1990a).

#### Shannon Diversity

Shannon diversity has long been used as an index of environmental condition (Weber 1973) and is a reliable measure of combined environmental stress in the Clark Fork drainage. This index has two components and is influenced by taxa richness and the distribution of individuals among taxa (evenness). Reference stations had an average Shannon diversity value of 3.7 with a standard deviation of 0.4. For this analysis, values greater than 3.3 were considered nonimpaired.

#### EPT to Chironomidae Ratio (EPT/EPTC)

This metric, originally developed by the EPA (Plafkin et al. 1989), is based on relative abundance of indicator groups. Most Ephemeroptera, Plecoptera, and Trichoptera are considered sensitive to environmental stresses while Chironomidae, as a group, are more tolerant. In the form  $(E+P+T) / (E+P+T+C)$ , this metric ranges from 0 to 1.

An even distribution of individuals among the four groups reflects good biotic condition while a disproportionate number of chironomids indicates environmental stress. For the Clark Fork analysis, values  $<0.55$  indicate impairment. Using this scale, the EPT/EPTC metric reliably identifies severe biological impairment but does not consistently separate slight, moderate and nonimpaired sites. In some cases, large populations of relatively tolerant EPT taxa (e.g. Baetidae, *Tricorythodes* or hydropsychids) result in high EPT/EPTC values. The percentage Baetidae of Ephemeroptera and percentage Hydropsychinae of Trichoptera metrics are included to identify slight to moderate impairment missed by the EPT/EPTC metric.

#### Percent Baetidae of Ephemeroptera

Members of the family Baetidae are among the most pollution-tolerant mayflies (Hubbard and Peters 1978). Slight to moderate environmental stress is indicated when baetids comprise most of the mayfly fauna. This metric ranges from 0 to 1 with high values ( $>0.85$ ) indicating biological impairment. This metric received a default value of 1 when no mayflies were collected.

### Percent Hydropsychinae of Trichoptera

The subfamily Hydropsychinae is, in general, more tolerant of pollution than most other caddisflies (Harris and Lawrence 1978). Environmental stress is indicated when most of the caddisflies in a sample are *Hydropsyche* and *Cheumatopsyche*. This metric is analogous to the Baetidae/Ephemeroptera metric and ranges from 0 to 1 with high values (>0.85) indicating biological impairment. When no caddisflies were collected, this metric received a default value of 1.

### Biotic Index

The biotic index is based on the indicator organism approach to water quality assessment and was developed to measure organic pollution. The index is calculated:  $\text{SUM} (\%RA_i * t_j)$ , where  $\%RA_i$  is the percent relative abundance of each taxon and  $t_j$  is the tolerance value of the taxon. This index is on a scale of 0 to 10 with higher values indicating more polluted conditions. Tolerance values used in this study (Appendix A) were taken from Hilsenhoff (1987) and McGuire (1992).

### Percent Relative Abundance of Filter Feeders

The relative abundance of functional feeding groups can provide useful insights into energy transfer, food resources and organic loading in aquatic ecosystems. Filter feeding insects typically comprise a major component of the summer macroinvertebrate fauna in Montana rivers. Relative abundance greater than 50 percent indicate high seston (suspended organics) concentrations that are usually associated with organic/nutrient enrichment, extensive filamentous algae growth, or lake outflows. This metric is used as a measure of organic pollution in the Clark Fork River Basin. Functional classifications were based on Merritt and Cummins (1984).

### EPT Richness

This metric summarizes species richness of Ephemeroptera, Plecoptera, and Trichoptera and was used as an indicator of metals pollution. The majority of mayfly, stonefly and caddisfly species are highly sensitive to pollution. With a few exceptions, species in these groups are among the first to be eliminated by metals toxicity (Wiederholm 1984, Clements 1991). EPT richness averaged 21 among Blackfoot River reference stations. The scoring criteria reflect the wide range of values found within the study area. While

minimizing influences of pollutants other than toxins, the wide range reduces the sensitivity of this metric to subtle changes.

#### Metal Tolerance Index (MTI)

This metric quantifies changes in community composition attributable to metals pollution in the Clark Fork River Basin. The format and calculation are based on Hilsenhoff's biotic index, with tolerance values assigned to each taxon based on sensitivity to metals rather than organics. The index is calculated:  $\text{SUM } (\%RA_i * t_i)$ , where  $\%RA_i$  is the percent relative abundance of each taxon and  $t_i$  is the tolerance value of the taxon. The theoretical scale of the index is 0 to 10 with higher values indicating communities more tolerant of metals pollution. MTI values for communities dominated by species intolerant of metals are less than 4 (i.e. Blackfoot River) while values for communities composed of only the most metals-tolerant species approach 10 (i.e. Silver Bow Creek). Small, but statistically significant differences in metric values are not reflected in assessment scores due to the wide criteria range necessitated by the inclusion of Silver Bow Creek data.

Metals tolerance values (Appendix A) for most taxa were developed from the 1987 and 1988 Clark Fork River Basin water quality (Ingman and Kerr 1989) and macroinvertebrate (McGuire 1987 and 1989a) data. Ingman and Kerr (1989) quantified metals pollution severity for each station based on the frequency and magnitude of measured copper, zinc, cadmium, and lead concentrations exceeding EPA chronic or acute criteria for the protection of aquatic life. Stations were ranked by metals pollution severity. Macroinvertebrate taxa were ranked according to their relative abundance and distributions along this gradient. Abundant taxa (comprising at least five percent of the fauna at any station) were assigned a rank corresponding to the station where they attained their maximum relative abundance. For less abundant taxa, ranks corresponded to the midpoint of their distribution within the study area. Ranks were transformed to a scale of 0 to 10, rounded to the nearest integer, and used as metals tolerance values. Some tolerance values, particularly for infrequently collected taxa, were modified based on the author's interpretation of pertinent literature (Clements 1991, Clements et al. 1988, Rolin 1988, Wiederholm 1984, Winner et al. 1980, Yasuno et al. 1985, Lynch et al 1988, Leland et al 1989).

### Stream Reaches

For some analyses, the study area is partitioned into ecologically distinct stream reaches. These data were used to summarize environmental health in relatively homogeneous river reaches and to evaluate temporal and longitudinal trends using a scale of miles rather than individual sites. Eight stream reaches are currently recognized (Table 1). Reaches vary in length from approximately 10 to 70 miles and currently include from one to four sampling stations. Stream reaches include:

- SBC Upper Silver Bow Creek; from the old Colorado Tailing site to the Warm Springs Ponds.
- CFR0 Lower Silver Bow Creek (below the Warm Springs Ponds) and the upper Clark Fork River downstream to Sager Lane.
- CFR1 Clark Fork River from Sager Lane to the Little Blackfoot River.
- CFR2 Clark Fork River from the Little Blackfoot River to Rock Creek.
- CFR3 Clark Fork River from Rock Creek to the Blackfoot River.
- CFR4 The Clark Fork River from Milltown Dam to the Bitterroot River.
- CFR5 Clark Fork River from the Bitterroot River to Alberton.
- CFR6 Clark Fork River from Superior to the Flathead River.

### Trend Analysis

Longitudinal and temporal trends in biological integrity within the Clark Fork River Basin were evaluated at several levels of resolution. Spearman rank correlation (Zar 1974) was used to identify temporal trends in biointegrity. Correlation coefficients ( $r_s$ ) were calculated to identify temporal trends at individual stations, within stream reaches, and for the study area as a whole. For most stations, analyses were based on 60 samples obtained over 15 years. The fixed reference for all stations and years facilitated this trend analysis.

**Table 2. Metrics and criteria used to determine biological integrity in the Clark Fork River Basin.**

Metric	Scoring Criteria						
	6	5	4	3	2	1	0
<b>General</b>							
Taxa richness	>39	39-35	34-30	29-25	24-20	19-15	<15
Shannon diversity	>3.3	3.3-3.0	2.9-2.6	2.5-2.2	2.1-1.8	1.7-1.4	<1.4
EPT/EPTC	>.54	.54-.45	.44-.35	.34-.25	.24-.15	.14-.05	<.05
Hydropsychinae/Trichoptera	<.85	.85-.87	.88-.90	.91-.93	.94-.96	.97-.99	1.00
Baetidae/Ephemeroptera	<.85	.85-.87	.88-.90	.91-.93	.94-.96	.97-.99	1.00
<b>Organic pollution subset</b>							
Density	550-1999	2000-2599	2600-3199	3200-3799	3800-4399	4400-4999	>5000
Biotic index	<4.0	4.0-4.5	4.6-5.1	5.2-5.7	5.8-6.3	6.4-6.9	>6.9
% Filterer	<51%	51-55%	56-60%	61-65%	66-70%	71-75%	>75%
<b>Metals pollution subset</b>							
Density	>549	549-450	449-350	349-250	249-150	149-50	<50
EPT richness	>21	21-18	17-14	13-10	9-6	5-2	<2
Metals Tolerance Index	<4.0	4.0-4.9	5.0-5.9	6.0-6.9	7.0-7.9	8.0-8.9	>8.9

All values are per 0.1 m2 Hess sample. Each metric was scored from 0 (severe impact) to 6 (no impact).

Biointegrity was estimated as the sum of metric scores divided by the maximum possible score.

### **Numerical criteria for the assessment of biologically significant environmental degradation.**

classification	% biointegrity	metric subsets indicating metals or organic pollution
nonimpaired	>90%	>80%
slightly impaired	70-90%	60-80%
moderately impaired	50-70%	40-60%
severely impaired	<50%	<40%

## 4. RESULTS AND DISCUSSION

Appendix A contains tolerance values for 230 macroinvertebrate taxa found in the study area since 1986. Identifications, organism counts, metric values, and summary statistics for 2001 are presented in Appendix B. For each station, mean metric values, metric scores, and percentage biointegrity assessments were calculated for each year that data were available (Appendix C). The 2001 habitat assessment data are contained in Appendix D.

### 4.1 Stream Discharge

Both peak flows and mean August discharge were well below average throughout the drainage for the second consecutive year (Table 3). Spring runoff was minimal with no sharp spikes. August stream flows were also below average. However, rain storms in late July and early August caused water levels to temporarily rise. We sampled the upper Clark Fork on a falling hydrograph as the storm water moved downstream.

### 4.2 Habitat Assessment

Aquatic and riparian condition was evaluated at 22 sites using the MDEQ Rapid Bioassessment Habitat Field Evaluation (Bukantis 1998). Based on visual observations, 9 habitat parameters were rated (Appendix D). These data do not represent quantitative habitat assessments. However, they provide a means of ranking stations by overall habitat quality and help to identify specific habitat problems.

Overall habitat condition was classified as sub-optimal at most sites in the study area. Overall habitat quality was rated as optimal (>124) at 7 sites, sub-optimal (124-92) at 14 sites, and marginal at 1 site. Streams receiving optimal habitat ratings included the Little Blackfoot, Rock Creek, Blackfoot and Bitterroot rivers (stations 10.2, 12.5, 14 and 19, respectively). Clark Fork River sites below Warm Springs (station 7) and near Missoula (stations 15.5 and 18) were also classified as optimal. Overall habitat was considered sub-optimal at all Clark Fork River sites from Dempsey to Turah (stations 08, 08.5, 09, 10, 11, 11.7, 12, and 13). Silver Bow Creek from Rocker to Opportunity (stations 01 and 02.5) and Blacktail Creek (station SF-1) had the poorest overall habitat.

Substrate characteristics were considered sub-optimal at most sites upstream from Rock Creek. Relatively high cobble embeddedness and excess sediment deposition was evident at all sites in the upper basin

except the Little Blackfoot River (stations 10.2). Marginal riparian conditions and bank stability were identified as limiting habitat features in portions of Silver Bow Creek (stations 01 and 2.5) and the lower Deer Lodge Valley (station 10). Riparian vegetation was sparse and lacked vigor throughout the study area during 2001. Stream flow status was somewhat biased by recent rains.

#### 4.3 Community Composition and Structure

Macroinvertebrate assemblages continued to be more diverse and complex than in previous years. Macroinvertebrates were more abundant in the Clark Fork River from the Warm Springs Ponds to Rock Creek (CFR0-2) than in downstream reaches (CFR3-6) or in tributaries. Taxa richness, EPT richness, and Shannon diversity were above average for most stream reaches (Table 4).

More than 130 taxa were identified from the study area during August, 2001. A total of 30 taxa attained relative abundance's of 5 percent or more at individual stations. These included 10 caddisflies, 4 mayflies, 3 beetles, 8 midges, blackflies, a snail, a scud, and an aquatic caterpillar.

Macroinvertebrate assemblages in Silver Bow Creek above the Warm Springs Ponds (SBC) were characterized by low diversity and taxa richness (Table 4) and were dominated by a few pollution tolerant dipterans. Silver Bow Creek below the Butte WWTP (station 01) supported a large blackfly population (*Simulium vittatum*). Mayflies, stoneflies, and most caddisflies were essentially absent from upper Silver Bow Creek. Other tributaries were characterized by high EPT richness and diversity. Tanytarsini midges were the most abundant macroinvertebrates in Warm Springs Creek, Little Blackfoot River, Rock Creek, and the Blackfoot River. The scud, *Hyalella azteca*, comprised 21% of the macroinvertebrates collected in Silver Bow Creek below the Warm Springs Ponds (station 04.5).

Community composition varied along the Clark Fork mainstream. Hydropsychid caddisflies were abundant throughout the river, but densities tended to be lower than during most years. The mayfly, *Tricorythodes minutus*, was very abundant and widely distributed in August, 2001. Blackflies and elmids were co-dominant with hydropsychids from Warm Springs downstream to the Little Blackfoot River (CFR0-1). *Tricorythodes* was numerically dominant from the Little Blackfoot River to Rock Creek (CFR2) and from the Bitterroot River to Huson (CFR5). Hydropsychids and chironomids were numerically dominant from Milltown Dam to the Bitterroot River (CFR4). *Cheumatopsyche* sp. and

tanytarsini midges were the most abundant macroinvertebrates in the Clark Fork River downstream from Superior (CFR6).

#### 4.4 Community Biointegrity during 2001

The overall affect of water quality on macroinvertebrate assemblages was estimated from the composite score of 10 metrics (Table 2). For discussion purposes, bioassessment scores are categorized as nonimpaired (90 to 100%), slightly impaired (70 to 90%), moderately impaired (50 to 70%), or severely impaired (<50%).

Benthic macroinvertebrate assemblages were relatively healthy throughout the Clark Fork River Basin in 2001 (Figure 2). For all stations combined, mean biointegrity (86%) was the highest ever recorded. Mean study area biointegrity averaged 74% for the 16-year monitoring period. Biointegrity scores were higher than the long-term averages for all sites except Silver Bow Creek at Rocker (station 01), Flint Creek (station 11.5) and the Clark Fork at Sager Lane (station 08.5).

Biointegrity was nonimpaired at 15 of 28 monitoring sites in 2001. Bioassessment scores (Table 5) ranged from 24% in Silver Bow Creek at Rocker (station 01) to 97% in the Clark Fork River at Turah (station 13). Moderate to severe biological impairment was restricted to the 3 sites in upper Silver Bow Creek (Figure 4). Slight biological impairment was indicated in Blacktail, lower Silver Bow, Warm Springs and Flint creeks (stations SF-1, 04.5, 06 and 11.5, respectively) and at 7 Clark Fork River stations. The Clark Fork River was slightly impaired from Sager Lane to the confluence of the Little Blackfoot River (stations 08.5, 09, and 10), below Milltown Reservoir (station 15.5), and in the lower portion of the study area (stations 25 and 27). All other Clark Fork River stations and tributaries were nonimpaired. The majority of sites have been classified as nonimpaired each year since 1999.

Based on mean stream reach values, most of the study area was classified as nonimpaired in 2001 (Figure 3). Silver Bow Creek above the Warm Springs Ponds (SBC) was severely impaired while the Clark Fork River from Deer Lodge to the Little Blackfoot River (CFR1) and downstream from Superior (CFR6) was slightly impaired. The Clark Fork River below the Warm Springs Ponds (CFR0) and from the Little Blackfoot River to Superior (CFR 2-5) was nonimpaired.

**Nutrient/organic pollution** was less pervasive in the Clark Fork River Basin during 2001 than in most previous years. Only 8 sites were classified as impaired due to excessive nutrient or organic loading (Table 5). Scores for the metrics most indicative of these pollutants ranged from 28 to 100%. Silver Bow Creek at Rocker (station 01) was severely impaired. All other monitoring sites had scores of 72% or higher and the study area mean was 83%. Slight nutrient/organic pollution was indicated at 7 sites.

Nutrient and organic pollution were most evident in Silver Bow Creek. Treatment lagoons in the former Colorado Tailings Area were identified as a source of nutrient and organic loading to upper Silver Bow Creek (station 00). Silver Bow Creek at Rocker (station 01) was severely impaired by effluent from the Butte WWTP. Slight nutrient/organic pollution was indicated in Silver Bow below the Warm Springs Ponds (station 04.5). The macroinvertebrate assemblage at this site was strongly influenced by organisms and food flowing from the eutrophic Warm Springs Ponds. Flint Creek was slightly impaired by non-point source pollution. Nutrient/organic pollution was not indicated in other monitored tributaries.

Biological impairment due to nutrient pollution was not indicated at most stations on the Clark Fork River during 2001. Nutrient pollution caused slight biological impairment from Deer Lodge to the Little Blackfoot River (stations 09 and 10). In contrast to past years, significant nutrient pollution was not indicated at any Clark Fork River station from the confluence of the Little Blackfoot River to Superior. Slight impairment consistent with nutrient enrichment was indicated in the Clark Fork above the confluence of the Flathead River (station 25).

**Metals pollution** was evident at only 5 stations in 2001 (Figure 4). Composite scores for metals-sensitive metrics ranged from 44 to 100% and averaged 85% for all stations combined (Table 5). Blacktail Creek (station SF-1) was slightly impaired by metals. Moderate to severe metals pollution was indicated throughout upper Silver Bow Creek (stations 00, 01, and 02.5). The Clark Fork at Deer Lodge (station 09) was the only site downstream from the Warm Springs Ponds where metals pollution was indicated in 2001. This site was classified as slightly impaired. The metals subset score for this site was 78%. A slight increase in EPT richness or a slight decrease in the metals tolerance index would have resulted in a nonimpaired classification.

## 4.5 Long-term Monitoring

### 4.5.1 Clark Fork River

Long-term data (Tables 6-8) were evaluated for 17 Clark Fork River stations in 7 stream reaches (Table 1). Silver Bow Creek below the Warm Springs Ponds (station 04.5) is included in the upper reach.

Biological integrity has improved throughout the Clark Fork River in recent years. The upper most reach of Clark Fork, from the Warm Springs Ponds to Sager Lane (CFR0), has shown the most significant improvement. This reach was moderately impaired prior to 1992, but was slightly impaired from 1992 through 1998 and has been classified as nonimpaired since 1999 (Table 6). The reach from Deer Lodge to the confluence of the Little Blackfoot River (CFR1) has been characterized as moderately impaired on 8 dates and slightly impaired during 8 years. This reach is currently the most impaired reach of the Clark Fork River. On average, biological integrity has been slightly impaired in downstream reaches (CFR2 through 6). Biointegrity was typically lower in the Clark Fork River from the confluence of the Bitterroot River to Alberton (CFR5) than in adjacent Clark Fork River reaches. However, this reach has been classified as nonimpaired each of the past 3 years.

Based on long-term averages, most Clark Fork River stations were classified as slightly impaired (Figure 5). However, the Clark Fork at Deer Lodge (station 09) was, on average, moderately impaired (64%). The Clark Fork at Turah (station 13) has the highest average biointegrity (89%) among Clark Fork River stations and has been nonimpaired during 7 of the past 8 years. Other stations with relatively high mean biointegrity scores (>80%) are the Clark Fork River at Sager Lane (station 08.5), at Gold Creek (station 11), from Milltown Dam to the confluence of the Bitterroot River (stations 15.5 and 18), and from Superior to the confluence of the Flathead River (stations 24 and 25). Biointegrity tends to be lower from Bearmouth to Bonita (stations 11.7 and 12) than at adjacent stations.

### 4.5.2 Clark Fork Basin Tributaries

Community-based assessments provide an overview of water quality at 12 stations on nine Clark Fork River tributaries. The period of record varies among sites (Table 1). The types and severity of pollutants varied substantially among streams (Figure 6). Blacktail Creek was slightly impaired by a combination of metals and nutrient/organic pollution. Silver Bow Creek above the Warm Springs Ponds (SBC) remains severely polluted

by metals and varying degrees of nutrient/organic pollution. Silver Bow Creek below the ponds (station 04.5) was impaired by organic pollution and, prior to 2000, slight metals pollution. Warm Springs Creek (station 05) was frequently impaired by metals pollution from 1986 through 1993, but has been nonimpaired during 5 of the past 6 years. Excellent water quality was indicated in the Little Blackfoot River, Rock Creek, and the Blackfoot River (stations 10.2, 12.5 and 14, respectively). In most years, Flint Creek (station 11.5) and the Bitterroot River (station 19) were slightly impaired by nutrient/organic pollution.

#### 4.5.3 Nutrient and Organic Pollution

Nutrient/organic pollution is the principle cause of biological impairment in the Clark Fork River (Figure 5). Slight impacts from nutrient and organic pollution were routinely detected at the majority of sites within the Clark Fork mainstem, and in Silver Bow Creek, Flint Creek, and the lower Bitterroot River (Table 8).

The Butte WWTP effluent is a major source of nutrients for Silver Bow Creek, the Warm Springs Ponds, and the upper Clark Fork River. Organic pollution was clearly indicated in Silver Bow Creek below the Butte WWTP (Table 8). Other nutrient sources to upper Silver Bow Creek and the Warm Springs Ponds include the treatment ponds in the former Colorado Tailings area, and the Rocker, Fairmont and Opportunity sewage treatment lagoons. Nutrients transported through Silver Bow Creek cause eutrophic conditions in the Warm Springs Ponds. Seston in the Warm Springs Ponds outflow has a significant impact on the trophic status of lower Silver Bow Creek and the upper few miles of the Clark Fork River (CFR0). The pond outflow also probably accounts for a substantial portion of the nutrient load to the remainder of the upper river.

Nutrient pollution has been indicated throughout the Clark Fork River. Impacts tend to be most pronounced in the upper river (CFR0, 1, and 2) and downstream from Missoula (CFR4). Recent improvements in nutrient-sensitive metric scores coincide with land application of WWTP effluent at Deer Lodge and Butte (partial land application). Non-point-source pollution appears to contribute to biological impairment in the lower Deer Lodge Valley (CFR1). Nutrients liberated from bank erosion and degraded riparian areas increase nutrient pollution. Low summer stream flows, high water temperatures, and excess sediments tend to exasperate nutrient pollution in this reach. Nutrient pollution is also indicated in the lower Bitterroot River (station 19) and Flint Creek (station 11.5).

#### 4.5.4 Metals Pollution

Metals-related impacts were routinely indicated in Silver Bow Creek, Warm Springs Creek, and the upper Clark Fork River during the 1980s and early 1990s (Tables 9 and 10). Metals pollution was generally categorized as severe in upper Silver Bow Creek and slight at downstream sites (Table 8). While severe metals pollution continues in upper Silver Bow Creek, metals-related impairment has diminished in most of the basin. Since 1993, impacts attributable to metals pollution have usually been slight, and confined to portions of the Clark Fork River within the Deer Lodge Valley. However, in 1997, metals caused moderate biological impairment in the lower Deer Lodge Valley (CFR1) and slight metals-related impacts were indicated from the confluence of the Little Blackfoot to Turah (CFR2 and CFR3).

Biointegrity has improved over time at 7 sites in the upper Clark Fork River Basin (Table 6). There has been a significant reduction in metals pollution in Silver Bow Creek at the former Colorado Tailings site (station 00). However, metals impacts remain evident at this site (Table 8). Significant trends of increasing biointegrity were also evident in the Mill-Willow Bypass, Warm Springs Creek and at the first 4 sites below the Warm Springs Ponds (stations 04.5, 07, 08, and 0.85). Metals pollution, as measured by the metals-sensitive metric subset, diminished over time throughout the upper Clark Fork (Tables 9 and 10).

These data reflect the effective treatment and containment of metals in the Warm Springs Ponds, and the removal or containment of sources in the Mill-Willow Bypass and Warm Springs Creek drainage. Slight impacts, consistent with metals contamination, continue in the lower Deer Lodge Valley (CFR1) and indicate additional metals sources in the Clark Fork floodplain. Recent metals-related impacts in the upper Clark Fork River appear to be the result of contaminated surface runoff and bank erosion caused by storm and high flow events.

#### 4.6 Site-Specific Assessments

##### **Blacktail Creek (station SF-1)**

Blacktail Creek above Grove Gulch was slightly impaired during 2001. Biointegrity was estimated at 86%. Metals pollution was indicated (72%) but organic pollution was not (100%). Midges, blackflies and riffle beetles were the most abundant macroinvertebrates at this site in 2001. Mayflies, stoneflies and caddisflies comprised about 24% of the benthic fauna.

Blacktail Creek has been monitored since 1993 and was classified as impaired during 8 of the past 9 years (Table 6). From 1993 through 1997, biointegrity was considered moderately impaired by the combined affects of poor habitat, metals, and organic pollution. However, biological integrity has improved markedly in the past 4 years (Figure 7). Nutrient/organic pollution has not been indicated since 1997. Slight metals pollution has been indicated each year and benthic habitat remains limited due to sand scouring and embeddedness. For the 9-year monitoring period, biointegrity scores have average 74% while the metals and nutrient/organic subsets have averaged 69 and 85%, respectively.

#### **Silver Bow Creek above the Butte WWTP (station 00)**

Silver Bow Creek above the Butte WWTP was classified as moderately impaired for the second straight year. This site, located at the downstream end of the former Colorado Tailings area, was classified as severely impaired prior to 2000 (Figure 8). The 2001 biointegrity estimate (52%) and the metals subset score (44%) were substantially higher than long-term site averages (32% and 24%, respectively). Mean taxa richness has more than doubled since 1996. Although chironomids remain numerically dominant, caddisflies, stoneflies and mayflies have been present in low numbers each of the past five years. Significant trends of improved biointegrity and decreased metals pollution are evident at this site (Tables 6 and 8).

#### **Silver Bow Creek at Rocker (station 01)**

Silver Bow Creek at Rocker remains severely polluted and has the lowest biointegrity in the study (Figure 3). Both the 2001 biointegrity estimate and the 16 year average were 24%. Severe metals and nutrient-organic pollution are consistently indicated (Figure 9). The macroinvertebrate assemblage consists of blackflies, midges, and tubificid oligochaetes. This site is downstream from the former Colorado Tailing and the Butte WWTP. Removal of streamside tailings and channel reconfiguration are scheduled for 2002.

#### **Silver Bow Creek at Opportunity (station 02.5)**

Silver Bow Creek at Opportunity was moderately impaired by metals pollution in 2001. Biointegrity was estimated at 57% with a metals subset score of 33%. The sparse macroinvertebrate assemblage was dominated by a few metals-tolerant midge and caddisfly species.

Data from stations 03 (discontinued after 1992) and 02.5 were used to evaluate temporal trends in this portion of Silver Bow Creek (Figure 10). This reach has been classified as severely impaired each year except 1994, 1996, 2000 and 2001. Biointegrity has averaged 46% during the past 16 years.

#### **Silver Bow Creek below the Warm Springs Ponds (station 04.5)**

Water quality continues to improve in Silver Bow Creek below the Warm Springs Ponds. The 2000 and 2001 biointegrity estimates (88%) are the highest recorded at this site during 16 years of monitoring. Biological integrity was classified as slightly impaired by nutrient/organic pollution during 2001. This is the second year that significant metals pollution has not been indicated. Taxa richness, EPT richness, and diversity have increased significantly since 1992. The metals tolerance index was at an all-time low (4.3) for this site in 2001 (Appendix D-5).

Prior to 1993, Silver Bow Creek below the Warm Springs Ponds was severely impaired by metals, nutrient and organic pollution. However, metals pollution has been reduced in recent years and biointegrity has improved significantly (Figure 11). Organic loading from the pond outflow appears to be the principal factor limiting biological integrity at this site.

#### **Mill-Willow Creeks Bypass (station MW-2)**

The Mill-Willow Bypass supports a diverse macroinvertebrate assemblage and has been classified as nonimpaired each of the past 3 years. The biointegrity estimate for 2001 was 91%.

From 1986 through 1992, metals impacts were evident and the stream was moderately impaired (Figure 12). In 2001, we collected an average of 46 taxa per Hess sample, more than double the number collected prior to restoration (Appendix C-6). The metals tolerance index declined from an average of 5.6 prior to 1992 to 4.3 during the last 3 years.

#### **Warm Springs Creek (station 06)**

Warm Springs Creek was classified as slightly impaired (86%) during 2001. However, neither metals pollution (94%) nor nutrient pollution (89%) were clearly indicated. The slightly impaired rating was due primarily to uncharacteristically low mayfly diversity.

Biointegrity has improved significantly in Warm Springs Creek during the past 16 years (Figure 13). Metals pollution was indicated during most years prior to 1996 and resulted in moderate impairment in 1986 and 1987 (Table 8). Nutrient/organic pollution has not been detected in Warm Springs Creek. Low stream flow precluded quantitative sampling in 1992.

#### **Clark Fork River below Warm Springs Creek (station 07)**

Biointegrity has improved dramatically at the uppermost station on the Clark Fork River (Figure 14) and was nonimpaired (94%) in 2001. Metals pollution has diminished (Table 8) while biological integrity has increased (Table 6) since reclamation and restoration activities in the Warm Springs Ponds, Mill-Willow Bypass, and Warm Springs Creek were completed in 1993. From 1986 through 1992, this site was moderately impaired and had the lowest biointegrity (60%) in the Clark Fork River. Biointegrity was slightly impaired from 1993 through 1996, but was classified as nonimpaired during 4 of the last 5 years. Metals pollution was detected at this site on all dates prior to 1993, but has been indicated only once (1995) in the past 8 years.

#### **Clark Fork River near Dempsey (station 08)**

The Clark Fork River at Dempsey was nonimpaired in 2001. Biointegrity was estimated at 94%. Water quality has improved significantly at this site in recent years (Figure 15). Moderate to slight impairment due to metals and nutrient pollution was indicated from 1986 through 1992. During that time, biointegrity averaged 74% and the mean scores for the metals and nutrient/organic subsets were 74% and 80%, respectively. This site was not sampled again until 1998. Biointegrity has averaged 90% during the past 4 years. Metals pollution has not been indicated since monitoring was resumed in 1998.

#### **Clark Fork River at Sager Lane (station 08.5)**

The Clark Fork River at Sager Lane was sampled from 1990 to 1992 and from 1998 and 2001. Biological integrity has been relatively high at this site on each date. Biointegrity has ranged from 88 to 91% and significant impairment has not been evident (Figure 16).

### **Clark Fork River at Deer Lodge (station 09)**

The Clark Fork River at Deer Lodge was slightly impaired in 2001. Biointegrity was estimated at 86% with both nutrient/organic and metals pollution indicated (78%). However, the macroinvertebrate community was more diverse and biointegrity was higher than at any time since monitoring began in 1986 (Table 6). Taxa richness has increased significantly in the past 3 years (Appendix C-11).

This site has the lowest average biointegrity (65%) in the Clark Fork River and has been classified as moderately impaired during 10 years and slightly impaired during 6 years. Slight metals pollution has been indicated during 13 of the past 16 years; however, nutrient/organic pollution generally appeared to have a greater impact on biointegrity (Figure 17).

### **Clark Fork River above Little Blackfoot River (station 10)**

Biological integrity in the Clark Fork River above the Little Blackfoot was slightly impaired (86%) in 2001. Nutrient/organic pollution (78%) was indicated but, for the second straight year, metals pollution (89%) was not.

This site has been impaired during all 16 years of monitoring. Metals and nutrient/organic pollution were routinely detected (Figure 18). Nutrient/organic pollution and habitat degradation, accentuated by low stream flow, were the most significant causes of impairment. However, slight metals pollution was indicated during 11 years and moderate impacts attributable to metals were indicated during 1997. The 1997 biointegrity estimate (48%) and the metals subset score (44%) were the lowest recorded at any Clark Fork River site since monitoring began (Tables 6 and 8). The 2000 and 2001 assessment scores were substantially higher than the 16-year average (biointegrity 71%; metals subset 76%; nutrient/organic subset 64%) for this site.

### **Little Blackfoot River (station 10.2)**

Biological integrity was nonimpaired (95%) in the Little Blackfoot River during 2001. Mean biointegrity during the past 9 years has been 93% and indicates excellent water quality. No trends in biointegrity were evident (Figure 19).

### **Clark Fork River at Gold Creek Bridge (station 11)**

Biological integrity was classified as nonimpaired (95%) at the Gold Creek Bridge site in 2001. This site has been classified as impaired during 12 of the last 16 years (Figure 20). The Clark Fork at the Gold Creek Bridge appears susceptible to excessive sand deposition, and slight reductions in biointegrity scores may reflect unstable habitat conditions (McGuire 1989b). With regard to water quality, this is usually one of the healthiest sites on the upper Clark Fork River. Since 1986, biointegrity has averaged 85% while the mean metals and nutrient/organic subset scores have been 83 and 79%, respectively. Nutrient/organic pollution was indicated on 7 dates. Metals pollution has been indicated on 5 dates, but only once during the past 9 years (1997).

### **Flint Creek (station 11.5)**

Biointegrity in Flint Creek was estimated at 85% and considered slightly impaired in 2001. During the past 9 years, Flint Creek has been classified as nonimpaired 3 times and slightly impaired 6 times. Non-point source nutrient and sediment pollution have generally been indicated (Figure 21). Metals pollution has not been indicated. The relatively low metals metric subset score in 1999 was apparently due to recent construction at the upstream bridge and poor sampling conditions during a storm surge (McGuire 2000).

### **Clark Fork River at Bearmouth (station 11.7)**

The Clark Fork River at Bearmouth has been monitored since 1993 and was nonimpaired (91%) in 2001. Nutrient pollution was clearly indicated during 5 years (Figure 22). Metals pollution was indicated at this site only once (1997) during the 9-year monitoring period.

### **Clark Fork River at Bonita (station 12)**

The Bonita site was classified as nonimpaired (94%) in 2001. Biointegrity was well above the long-term average of 72%. Annual biointegrity estimates are highly variable at this site, ranging from moderately impaired (56%) to nonimpaired (97%) during the monitoring period. High variability may be due to unstable habitat conditions in this reach. Slight to moderate nutrient/organic pollution has been indicated during 13 of the past 16 years (Figure 23). Slight metals pollution was indicated 6 times between 1986 and 1992, but has been indicated only once (1997) since 1992.

### **Rock Creek near Clinton (station 12.5)**

Biological integrity was nonimpaired in Rock Creek on all 9 dates sampled (Figure 24). Biointegrity scores have averaged 94% and consistently indicated excellent water quality. The 2001 biointegrity estimate was 95%.

### **Clark Fork River at Turah (station 13)**

Biointegrity was nonimpaired (97%) at Turah for the fourth straight year. This site has the highest average biointegrity in the Clark Fork River (89%) and is among the healthiest stations in the study area. Biological integrity has been nonimpaired each year since 1992 except 1997 (Figure 25). Slight metals pollution was indicated at this site in 1986, 1990, and 1997 while nutrient and organic pollution was indicated in 1987, 1988, 1990 and 1992.

### **Blackfoot River near mouth (station 14)**

The lower Blackfoot River continued to be among the healthiest sites in the study area and was nonimpaired in 2001. Biointegrity was estimated at 91%. Biointegrity has averaged 90% at this site over the past 15 years (Figure 26). Slight impairment was detected from 1986 through 1989 and was attributed to reduced sediment transport and higher temperatures during a drought. High flows during 1997 also resulted in a slightly lower biointegrity score (83%).

### **Clark Fork River above Missoula (station 15.5)**

This site, located approximately 1.5 miles below Milltown Dam, was classified as slightly impaired in 2001. However, neither metals (89%) nor nutrient pollution (83%) were indicated. Biointegrity has average 82% during the 13-year period of record. Slight to moderate nutrient-organic pollution was usually evident (Figure 27). Metals pollution has not been indicated at this site since 1990.

### **Clark Fork River at Shuffield's (station 18)**

The Clark Fork at Shuffield's was classified as nonimpaired (94%) during 2001. Biointegrity was well above the 16-year average (86%). Slight nutrient/organic pollution was frequently indicated at this site (Figure 28) which is approximately two miles below the Missoula WWTP discharge. Metals pollution has not been clearly indicated at this site since monitoring began in 1986; however, both the 1997 and 1998 assessments were borderline (78%).

#### **Bitterroot River near mouth (station 19)**

Biointegrity was estimated at 94% and considered nonimpaired in the lower Bitterroot River during 2001. Biointegrity has averaged 86% since 1986. Nutrient/organic pollution has been indicated during 10 of the past 16 years (Figure 29). Metals pollution has not been indicated at this site.

#### **Clark Fork River at Harper Bridge (station 20)**

The Clark Fork at Harper Bridge was classified as nonimpaired in 2000. Biological integrity was estimated at 95%. This site has the lowest long-term mean biointegrity (78%) among stations from Missoula to the Flathead River. However, biointegrity scores have improved significantly at this site and have been rated as nonimpaired each of the past 3 years. Nutrient/organic pollution was indicated at Harper Bridge on all dates prior to 1999 (Figure 30). Impacts were generally slight, although moderate impacts were indicated in 1988 and 1993.

#### **Clark Fork River at Huson (station 22)**

For the first time in during the 16-year monitoring period, the Clark Fork River at Huson was classified as nonimpaired (95%). Prior to 2001, biointegrity had been slightly to moderately impaired on all dates. The long-term average for this site is 79%. Nutrient/organic pollution was not indicated in 1999 or 2001 but was evident on all other dates (Figure 31). This site was not sampled in 2000 due to access and fire restrictions. Biointegrity was moderately impaired in 1986, 1988, and 1994 and slightly impaired on all other dates.

#### **Clark Fork River near Superior (station 24)**

Biointegrity was nonimpaired (91%) in the Clark Fork River near Superior for the third straight year. Biointegrity has averaged 83% during the past 16 years with slight nutrient/organic pollution indicated on 10 dates (Figure 32). Metals pollution has not been indicated at this site.

#### **Clark Fork River above the Flathead River (station 25)**

The Clark Fork River above the confluence of the Flathead River was slightly impaired (85%) in 2001. Since 1986, biointegrity has averaged 83% at this site. Slight nutrient/organic pollution was indicated during most years, including 2001 (Figure 33).

#### **Clark Fork River above Thompson Falls Reservoir (station 27)**

The Clark Fork River above Thompson Falls is unique among monitoring sites in this study. The sampling technique and analyses used to evaluate the rest of the study area are only marginally suited to this site. The large river habitat, high discharge, and unique benthic community in this reach bias the biointegrity assessment. Nevertheless, the data can be used to monitor trends at this site.

The biointegrity score for the Clark Fork above Thompson Falls Reservoir was 83% during 2000. Biointegrity scores have averaged 72% during 15 years of monitoring at this site but have been well above average the past 3 years (Figure 34). Improved biointegrity at this site coincides with, and may be the result of, more constant stream flows. Prior to 1998, Kerr Dam was operated as a peaking facility which resulted in daily water level fluctuations in this portion of the lower Clark Fork River. Sampling during 1998 was conducted only 10 days after a low flow test at Kerr.

**Table 3. Annual peak flows and mean August streamflows at selected USGS gaging stations in the Clark Fork River Basin (cubic feet per second).**

**Peak discharge**

Annual peak year	Silver Bow Creek blw Blacktail Cr. USGS # 12323250	Clark Fork River at Deer Lodge USGS # 12324200	Clark Fork River below Missoula USGS # 12353000	Clark Fork River near Plains USGS # 12389000
1986	253	<b>2090</b>	32300	76800
1987	270	463	15800	35800
1988	224	409	14300	<b>29200</b>
1989	152	1430	26300	58800
1990	320	507	22200	65900
1991	216	1020	27200	74100
1992	232	367	<b>12400</b>	30100
1993	165	613	23400	50500
1994	159	462	16900	31600
1995	320	1240	25500	73700
1996	272	1400	38200	90300
1997	276	2020	<b>55100</b>	<b>110000</b>
1998	<b>447</b>	1090	21000	58900
1999	204	819	31300	63000
2000	<b>74</b>	<b>263</b>	13500	42600
2001	236	310	15900	29300
mean	239	906	24456	57538

**Mean August discharge**

August mean year	Silver Bow Creek blw Blacktail Cr. USGS # 12323250	Clark Fork River at Deer Lodge USGS # 12324200	Clark Fork River below Missoula USGS # 12353000	Clark Fork River near Plains USGS # 12389000
1986	19.5	55.7	1812	7612
1987	27.7	88.5	1473	9813
1988	18.7	<b>27.8</b>	<b>997</b>	<b>5656</b>
1989	22.0	81.7	2464	14750
1990	25.8	84.3	2554	10510
1991	16.4	30.1	1997	10350
1992	14.2	40.1	1280	9738
1993	<b>28.7</b>	312	<b>3696</b>	11770
1994	16.1	36.3	1295	5891
1995	21.8	107	2561	10360
1996	18.7	95.2	2766	16530
1997	27.5	<b>337</b>	3620	<b>17700</b>
1998	24.6	117	2890	13660
1999	22.4	93.4	2625	13400
2000	14.5	34.5	1145	9010
2001	<b>14.0</b>	42.1	1865	6589
mean	21	99	2190	10834

high and low flows in bold

**Table 4. Mean metric values characterizing macroinvertebrate assemblages in eight Clark Fork River Basin stream reaches during August, 1986 through 2001 (ranges in parentheses).**

metric	SBC		CFR0		CFR1		CFR2		CFR3		CFR4		CFR5		CFR6		TRIBS	
	1986-2000 (range)	2001	1986-2000 (range)	2001	1986-2000 (range)	2001	1986-2000 (range)	2001	1986-2000 (range)	2001	1986-2000 (range)	2001	1986-2000 (range)	2001	1986-2000 (range)	2001	1986-2000 (range)	2001
Density	514 (88-1103)	<b>1295</b>	1993 (896-2956)	<b>2227</b>	1992 (327-3249)	<b>2401</b>	1673 (392-4238)	<b>2025</b>	1733 (226-5635)	<b>1128</b>	1100 (492-2041)	<b>1840</b>	1562 (198-3733)	<b>945</b>	1002 (393-2418)	<b>1130</b>	746 (409-1120)	<b>963</b>
Taxa richness	11 (7-17)	<b>19</b>	30 (20-42)	<b>43</b>	29 (22-40)	<b>37</b>	33 (24-40)	<b>44</b>	39 (28-50)	<b>45</b>	36 (28-45)	<b>45</b>	33 (26-44)	<b>43</b>	34 (25-42)	<b>36</b>	36 (33-40)	<b>41</b>
EPT richness	2 (1-4)	<b>3</b>	13 (8-20)	<b>19</b>	14 (10-19)	<b>17</b>	17 (13-22)	<b>21</b>	22 (16-26)	<b>26</b>	20 (16-25)	<b>20</b>	18 (16-22)	<b>21</b>	19 (14-23)	<b>20</b>	20 (18-21)	<b>21</b>
S. Diversity	1.8 (1.5-2.1)	<b>1.8</b>	2.9 (2.1-3.8)	<b>3.6</b>	2.7 (1.9-3.9)	<b>3.5</b>	3.1 (2.7-3.8)	<b>3.6</b>	3.7 (3.1-4.4)	<b>4.6</b>	3.4 (2.9-4.0)	<b>4.0</b>	3.2 (2.2-4.1)	<b>3.9</b>	3.4 (2.6-3.8)	<b>3.4</b>	3.7 (3.3-4.1)	<b>3.4</b>
EPT/EPTC	0.18 (.04-.32)	<b>0.22</b>	0.84 (.69-.97)	<b>0.82</b>	0.85 (.68-.95)	<b>0.82</b>	0.84 (.74-.92)	<b>0.86</b>	0.75 (.61-.92)	<b>0.71</b>	0.80 (.62-.91)	<b>0.53</b>	0.78 (.52-.94)	<b>0.73</b>	0.74 (.60-.86)	<b>0.89</b>	0.65 (.51-.81)	<b>0.52</b>
Baetidae/ Ephemeroptera	0.96 (.67-1.00)	<b>0.92</b>	0.74 (.19-.98)	<b>0.50</b>	0.76 (.41-1.00)	<b>0.29</b>	0.68 (.24-.96)	<b>0.12</b>	0.49 (.22-.87)	<b>0.29</b>	0.61 (.34-.90)	<b>0.30</b>	0.59 (.19-.90)	<b>0.12</b>	0.41 (.19-.69)	<b>0.25</b>	0.52 (.40-.65)	<b>0.43</b>
Hydropsychinae/ Trichoptera	0.69 (.65-1.00)	<b>0.82</b>	0.88 (.65-.99)	<b>0.63</b>	0.88 (.57-1.00)	<b>0.60</b>	0.82 (.53-.98)	<b>0.86</b>	0.81 (.54-.96)	<b>0.45</b>	0.84 (.47-.95)	<b>0.59</b>	0.86 (.45-.98)	<b>0.78</b>	0.88 (.72-.97)	<b>0.83</b>	0.52 (.31-.72)	<b>0.42</b>
% Filterer	36 (7-55)	<b>58</b>	52 (29-72)	<b>39</b>	65 (35-81)	<b>51</b>	56 (26-72)	<b>28</b>	47 (22-68)	<b>29</b>	58 (36-75)	<b>32</b>	59 (33-74)	<b>24</b>	63 (52-86)	<b>61</b>	41 (31-53)	<b>37</b>
Biotic index	5.5 (5.1-6.1)	<b>5.5</b>	5.0 (4.7-5.3)	<b>5.1</b>	5.0 (4.8-5.4)	<b>4.9</b>	4.9 (4.5-5.6)	<b>4.9</b>	4.5 (3.8-5.1)	<b>4.5</b>	4.5 (4.2-5.2)	<b>4.9</b>	4.7 (3.6-5.3)	<b>4.6</b>	4.7 (4.2-5.0)	<b>4.8</b>	4.0 (3.7-4.2)	<b>4.2</b>
Metals index	8.1 (7.3-8.9)	<b>7.4</b>	5.1 (4.6-5.6)	<b>4.6</b>	5.1 (4.7-5.6)	<b>4.9</b>	4.8 (4.4-5.3)	<b>4.4</b>	4.5 (3.5-5.3)	<b>4.1</b>	4.5 (4.0-5.7)	<b>4.3</b>	4.6 (3.3-5.3)	<b>4.1</b>	4.0 (3.5-4.7)	<b>3.6</b>	3.8 (3.4-4.1)	<b>3.6</b>

Stream reaches: SBC = stations 00, 01, 02.5; CFR0 = 04.5, 07, 08, 08.5; CFR1 = 09, 10; CFR2 = 11, 11.7, 12; CFR3 = 13; CFR4 = 15.5, 18; CFR5 = 20, 22; CFR6 = 24, 25; TRIBS = 06, 10.2, 11.5, 12.5, 14, 19.  
2001 values in bold were outside established ranges.

**Table 5. Macroinvertebrate community biointegrity estimates for Clark Fork River Basin stations during August, 2001.**

Station	% Bio integrity		
	overall	metals subset	organic subset
SF-1	86 *	72 *	100
Silver Bow Creek			
00	52 **	44 **	72 *
01	24 ***	44 **	28 ***
02.5	57 **	33 **	83
Clark Fork River			
04.5	88 *	83	72 *
07	94	94	83
08	94	89	89
08.5	88 *	83	83
09	86 *	78 *	78 *
10	86 *	89	78 *
11	95	89	94
11.7	91	89	78
12	94	94	83
13	97	94	94
15.5	88 *	89	83
18	94	94	83
20	95	89	94
22	95	94	89
24	91	89	83
25	85 *	94	72 *
27	83 *	78 *	75 *
Tributaries			
MW-2	91	89	78
06	86 *	94	89
10.2	95	94	89
11.5	85 *	83	72 *
12.5	95	100	100
14	91	94	100
19	94	89	94
Reach means			
SBC	44 ***	40 ***	61 *
CFR0	91	87	82
CFR1	86 *	84	78 *
CFR2	93	91	85
CFR3	97	94	94
CFR4	91	92	83
CFR5	95	92	92
CFR6	88 *	92	78 *
Tributaries	91	92	89
ALL	86 *	84	83

Classification : slightly impaired \*, moderately impaired \*\*, severely impaired \*\*\*.

Table 6. Mean macroinvertebrate biointegrity (%) and Spearman rank correlation coefficients (rs) for Clark Fork River Basin monitoring stations - August, 1986-2001.

station	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean	S.D.	rs	P value
SF-1								64	74	68	65	61	74	80	91	86	74	10	.62	.00
Silver Bow Creek																				
00		18	32	15	22	35	17	22	35	27	30	47	33	41	55	52	32	13	.80	.000
01	38	17	32	13	26	25	20	20	21	25	27	18	23	33	24	24	24	6	.10	.43
02.5	38	40	35	50	43	43	43	47	55	43	50	38	45	50	52	57	46	6	.43	.000
Clark Fork River																				
04.5	45	44	44	47	41	45		71	70	59	62	58	61	83	88	88	60	17	.82	.000
07	59	64	53	59	55	65	65	83	82	88	77	94	86	94	92	94	76	15	.86	.000
08	71	65	71	65	85	73	88						85	91	89	94	80	11	.78	.000
08.5					88	88	89						91	89	91	88	89	1	.37	.05
09	52	65	62	73	61	83	55	86	53	58	55	55	68	79	86		65	12	.15	.22
10	52	68	71	80	79	86	68	87	59	74	65	48	59	77	82	86	71	12	.15	.25
11	86	80	85	88	63	89	85	92	94	86	78	62	86	88	95	95	85	10	.27	.03
11.7								94	67	73	70	55	85	94	79	91	79	14	.24	.15
12	64	80	58	76	61	64	56	89	76	74	70	57	76	97	68	94	73	13	.32	.01
13	88	80	76	88	86	92	83	95	89	94	94	82	91	98	94	97	89	6	.52	.000
15.5	76	88	86	77	68	79	80	90	82	83	85	71	82	95	91	88	83	7	.39	.00
18	73	88	91	80	86	91	83	95	80	94	86	78	79	95	88	94	86	7	.25	.05
20	71	77	61	79	73	79	76	61	79	82	76	83	76	92	95	95	78	10	.60	.000
22	62	86	68	89	88	71	74	85	68	79	75	78	82	88		95	79	9	.34	.01
24	90	79	76	73	88	85	92	91	74	89	73	71	79	92	92	91	83	8	.13	.31
25	83	85	82	76	80	83	88	80	82	98	77	73	88	88	86	85	83	6	.28	.03
27		65	68	64	67	72	67	67	78	72		75	73	85	78	83	72	7	.64	.000
Tributaries																				
MW-2	58	61	67	61		43								97	94	91	72	20	.59	.000
06	67	78	80	82	78	91		77	91	75	90	90	92	95	94	86	84	8	.60	.000
10.2								90	94	97	92	88	88	95	94	95	93	3	-.08	.65
11.5								77	83	92	85	88	91	83	92	85	86	5	.26	.13
12.5								91	93	93	95	90	98	92	93	95	93	2	.07	.69
14	82	83	90	85	92	88	89	90	95	97	92	83	95	92	92	91	90	5	.50	.000
19	79	83	82	91	85	86	79	90	73	98	85	87	92	93	86	94	86	6	.33	.01
Reach means																				
SBC		25	33	26	30	34	27	30	37	32	36	34	34	41	44	44	34	6	.39	.01
CFR0	58	58	56	57	67	68	81	77	76	74	70	76	81	89	90	91	73	12	.70	.000
CFR1	52	67	67	77	70	85	62	87	56	66	60	52	57	73	81	86	68	12	.17	.35
CFR2	75	80	72	82	62	77	71	92	79	78	73	58	82	93	81	93	78	10	.30	.06
CFR3	88	80	76	88	86	92	83	95	89	94	94	82	91	98	94	97	89	6	.68	.004
CFR4	75	88	89	79	77	85	82	93	81	89	86	75	81	95	90	91	84	6	.33	.07
CFR5	67	82	65	84	81	75	75	73	74	81	76	81	79	90	95	95	79	9	.51	.00
CFR6	87	82	79	75	84	84	90	86	78	94	75	72	84	90	89	88	83	6	.20	.26
TRIBs								86	88	92	90	88	93	92	92	91	90	2	.22	.10
All stations	67	68	67	69	69	72	70	77	74	77	73	69	76	84	83	86	74	6	.86	.000

\* Stream reaches: SBC = stations 00, 01 &amp; 02.5; CFR0 = stations 04.5, 07, 08, 08.5; CFR1 = stations 09 &amp; 10; CFR2 = stations 11, 11.7, &amp; 12; CFR3 = station 13;

CF4 = stations 15.5 &amp; 18; CFR5 = stations 20 &amp; 22; CFR6 = stations 24 &amp; 25; Tribs = stations 06, 10.2, 11.5, 12.5, 14 &amp; 19.

Table 7. Macroinvertebrate biointegrity (%) as measured by metrics\* sensitive to organic pollution and Spearman rank correlation coefficients (rs) for Clark Fork River Basin stations - August, 1988-2001.

station	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean	S.D.	rs	P value
SF-1								56	94	78	78	72	89	94	100	100	85	15	.55	.00
Silver Bow Creek																				
00		83	83	58	75	83	67	83	83	75	75	92	75	78	78	72	77	8	.01	.93
01	67	67	67	17	50	58	42	28	33	67	61	58	39	67	39	28	49	17	-.14	.25
02.5	83	83	33	100	83	75	42	92	61	92	75	92	92	100	67	83	78	19	.21	.10
Clark Fork River																				
04.5	50	56	44	39	39	56		83	72	56	50	33	33	78	72	72	56	17	.40	.00
07	72	72	50	78	56	72	83	83	83	83	67	89	67	89	83	83	76	11	.46	.000
08	78	78	78	67	89	83	89						72	89	89	89	82	8	.39	.01
08.5					89	89	83						89	83	78	83	85	4	-.54	.003
09	56	67	50	61	44	83	50	89	50	50	39	50	44	44	61	78	57	15	-.09	.47
10	39	61	56	83	67	89	67	83	50	67	50	58	56	61	67	78	65	14	.02	.89
11	89	72	92	89	42	89	78	94	89	83	67	42	78	83	89	94	79	16	-.02	.87
11.7								89	50	61	67	42	83	83	50	78	67	17	.08	.64
12	72	83	33	67	61	50	44	89	72	67	72	58	72	94	39	83	66	18	.11	.40
13	89	67	44	89	83	83	67	92	89	89	83	92	89	94	83	94	83	13	.41	.00
15.5	72	75	81	58	42	78	83	100	78	67	72	61	67	100	89	83	75	15	.31	.02
18	67	89	94	78	72	89	61	89	61	89	67	50	78	89	67	83	76	13	-.09	.49
20	67	67	39	78	67	72	61	33	67	67	61	67	61	92	89	94	68	16	.37	.002
22	61	78	50	89	92	61	61	78	33	67	67	100	75	92		89	73	18	.42	.001
24	83	72	61	61	78	83	89	89	61	78	61	61	61	83	83	83	74	11	-.03	.82
25	92	83	72	72	72	83	83	61	72	94	56	56	78	75	61	72	74	12	-.23	.07
27		42	56	56	33	50	61	42	67	50		83	75	83	83	75	61	17	.64	.000
Tributaries																				
MW-2	58	61	78	56		42								100	89	78	70	19	.48	.01
06	100	92	75	94	83	94		92	94	92	92	100	100	94	94	89	92	6	-.01	.92
10.2								92	94	94	89	92	92	94	94	89	92	2	-.11	.53
11.5								67	72	89	67	78	89	83	94	72	79	10	.17	.33
12.5								100	100	100	100	100	100	92	100	100	99	3	-.35	.04
14	100	83	83	100	100	100	94	92	92	100	92	67	92	100	94	100	93	9	.09	.49
19	72	72	72	83	72	78	67	92	56	94	72	67	83	100	67	94	78	12	.19	.12
Reach means																				
SBC		78	61	58	69	72	50	68	59	78	70	81	69	82	61	61	68	9	.04	.79
CFR0	67	69	57	61	68	75	85	83	78	70	59	61	65	85	81	82	72	10	.33	.02
CFR1	48	64	53	72	56	86	59	86	50	59	45	54	50	53	64	78	61	13	-.01	.98
CFR2	81	78	63	78	52	70	61	91	70	70	69	47	78	87	59	85	71	12	.03	.86
CFR3	89	67	44	89	83	83	67	92	89	89	83	92	89	94	83	94	83	13	.54	.03
CFR4	70	82	88	68	57	84	72	95	70	78	70	56	73	95	78	83	76	11	.09	.63
CFR5	64	73	45	84	80	67	61	56	50	67	64	84	68	92	89	92	71	15	.38	.04
CFR6	88	78	67	67	75	83	86	75	67	86	59	59	70	79	72	78	74	9	-.18	.34
TRIBS								89	85	95	85	84	93	94	91	91	90	4	.08	.57
All stations	73	73	63	72	68	76	69	80	71	78	70	70	75	86	78	83	74	6	.51	.04

\* metric subset: biotic index, % filterers and community density.

Table 8. Macroinvertebrate biointegrity (%) as measured by metrics\* sensitive to metals pollution and Spearman rank correlation coefficients (rs) for Clark Fork River Basin stations - August, 1986-2001.

station	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean	S.D.	rs	P value
SF-1								67	67	72	67	61	72	72	72	72	69	4	.35	.04
Silver Bow Creek																				
00		0	0	11	22	17	11	11	39	17	33	39	28	44	50	44	24	16	.86	.000
01	39	6	44	33	44	33	28	44	44	28	39	17	44	50	44	44	36	12	.30	.02
02.5	22	17	44	28	22	28	50	33	56	22	44	22	28	22	44	33	32	12	.14	.27
Clark Fork River																				
04.5	61	61	61	67	67	61		72	72	61	72	72	72	78	89	83	70	9	.82	.000
07	72	72	78	72	72	72	72	83	83	78	83	89	94	89	89	94	81	8	.85	.000
08	78	72	72	72	72	67	83						83	89	89	89	79	8	.74	.000
08.5						83	83	83					83	83	89	83	84	2	.64	.000
09	78	78	72	83	72	83	72	78	72	72	78	67	78	78	83	78	76	5	.21	.10
10	72	78	72	67	78	83	78	78	78	78	83	44	78	78	89	89	76	10	.42	.001
11	83	78	78	89	67	83	78	89	94	83	83	67	89	83	94	89	83	8	.34	.01
11.7								89	89	83	83	72	89	94	94	89	87	7	.38	.02
12	78	83	78	78	72	78	78	83	83	83	83	61	89	94	89	94	82	8	.38	.003
13	78	89	94	83	78	89	94	94	89	89	94	61	94	100	94	94	88	9	.44	.000
15.5	83	92	92	72	78	83	83	83	89	94	94	83	94	89	94	89	87	7	.45	.000
18	83	89	89	83	89	89	94	94	94	89	94	78	78	94	94	94	89	6	.20	.12
20	83	83	78	78	78	83	83	89	83	89	89	78	94	83	94	89	85	5	.37	.002
22	83	89	83	89	78	83	83	83	83	83	78	83	83	78		94	84	4	-.22	.09
24	89	83	89	83	94	83	94	94	83	94	83	83	94	94	100	89	89	6	.14	.28
25	67	89	94	83	89	83	89	94	94	100	94	89	89	83	100	94	89	8	.44	.000
27		72	78	72	78	78	78	67	78	67		50	56	72	67	78	71	9	-.18	.18
Tributaries																				
MW-2	61	72	67	72		50								94	89	89	74	15	.67	.000
06	50	56	67	72	67	83		72	83	67	83	78	89	94	94	94	77	14	.83	.000
10.2								89	94	94	89	78	78	100	94	94	90	8	.12	.50
11.5								89	89	89	94	89	89	67	89	83	86	8	-.08	.65
12.5								94	89	83	89	78	94	89	89	100	89	6	.18	.31
14	61	83	83	67	83	72	100	83	94	94	83	78	94	78	100	94	84	11	.41	.000
19	83	89	89	94	83	89	89	78	83	100	89	83	94	83	94	89	88	6	.02	.85
Reach means																				
SBC		8	29	24	29	26	30	29	46	22	39	26	33	39	46	40	29	10	.44	.002
CFR0	70	68	70	70	74	71	79	78	78	70	78	81	83	85	89	87	74	7	.71	.000
CFR1	75	78	72	75	75	83	75	78	75	75	81	56	78	78	86	84	75	7	.29	.10
CFR2	81	81	78	84	70	81	78	87	89	83	83	67	89	90	92	91	81	7	.55	.000
CFR3	78	89	94	83	78	89	94	94	89	89	94	61	94	100	94	94	87	9	.50	.05
CFR4	83	91	91	78	84	86	89	89	92	92	94	81	86	92	94	92	87	5	.39	.03
CFR5	83	86	81	84	78	83	83	86	83	86	84	81	89	81	94	92	83	4	.29	.12
CFR6	78	86	92	83	92	83	92	94	89	97	89	86	92	89	100	92	88	5	.39	.03
TRIBs								84	89	88	88	81	90	85	93	92	86	4	.27	.04
All stations	70	70	73	70	71	72	76	77	80	76	79	68	80	80	85	84	74	5	.71	.001

\* metric subset: metals tolerance index, EPT richness and community density.

**Table 9. Percentage of site assessments indicating significant biological impairment from metals in the Upper Clark Fork River Basin during 3 time periods (1986-2001).**

Reach	percentage of metals subset scores < 80%		
	1986-1991	1992-1997	1998-2001
Upper Silver Bow Creek	100	100	100
Mill-Willow Bypass	100	no data	0
Warm Springs Creek	83	33	0
Clark Fork River reaches			
CFR0	90	54	13
CFR1	75	92	63
CFR2	67	29	0
CFR3	33	17	0

**Table 10. Mean EPT richness and metals tolerance index values in the Upper Clark Fork River Basin during 3 time periods (1986-2001).**

10a. Number of mayfly, stonefly and caddisfly taxa per Hess sample

Reach	EPT richness		
	1986-1991	1992-1997	1998-2001
Upper Silver Bow Creek	2	2	3
Mill-Willow Bypass	9	no data	21
Warm Springs Creek	12	15	21
Clark Fork River reaches			
CFR0	9	14	18
CFR1	13	14	17
CFR2	16	18	21
CFR3	20	23	24

10b. Mean community metals tolerance

Reach	MTI value		
	1986-1991	1992-1997	1998-2001
Upper Silver Bow Creek	8.3	8.6	7.6
Mill-Willow Bypass	5.6	no data	4.3
Warm Springs Creek	4.9	4.2	3.8
Clark Fork River reaches			
CFR0	5.2	5.1	4.8
CFR1	5.1	5.2	5.1
CFR2	5.0	4.8	4.6
CFR3	4.9	4.3	4.1

Figure 2. Long-term aquatic macroinvertebrate community biointegrity at 28 stations in the Clark Fork River Basin during August (1986-2000 and 2001).

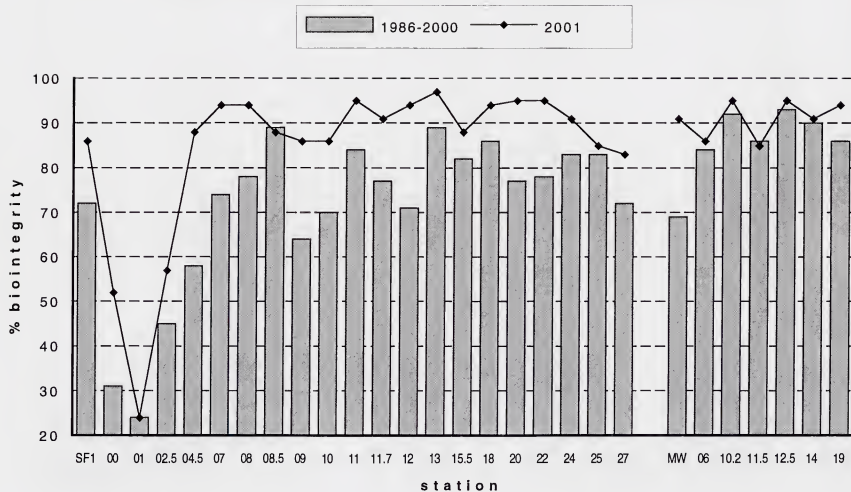


Figure 3. Mean aquatic macroinvertebrate community biointegrity in Clark Fork River Basin stream reaches and tributaries during August, 2001.

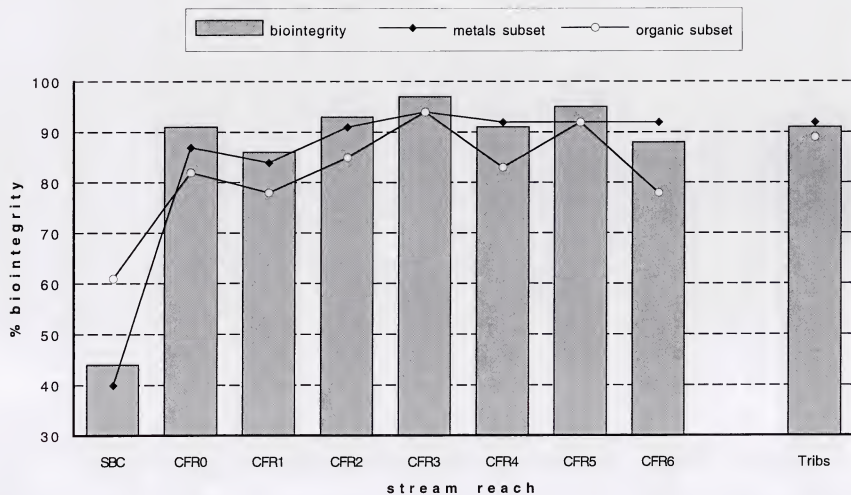


Figure 4. Aquatic macroinvertebrate community biointegrity at 28 stations in the Clark Fork River Basin during August, 2001.

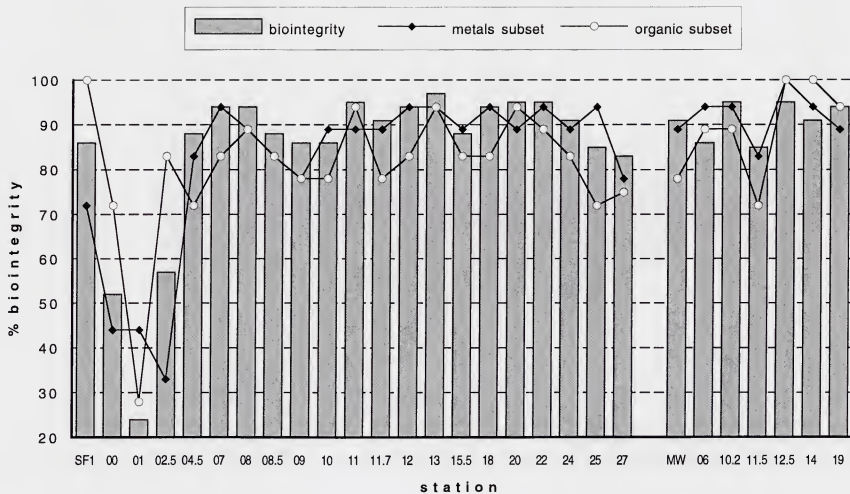


Figure 5. Mean aquatic macroinvertebrate community biointegrity at 20 stations on the Clark Fork River mainstem, 1986 - 2001.

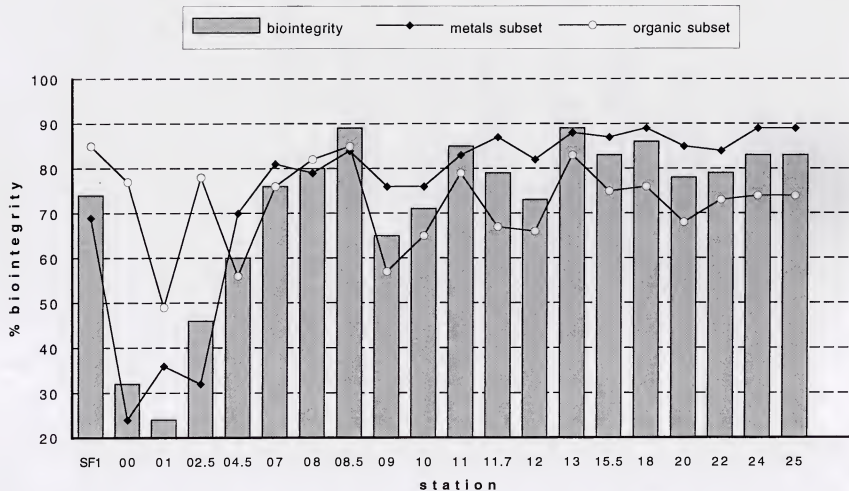
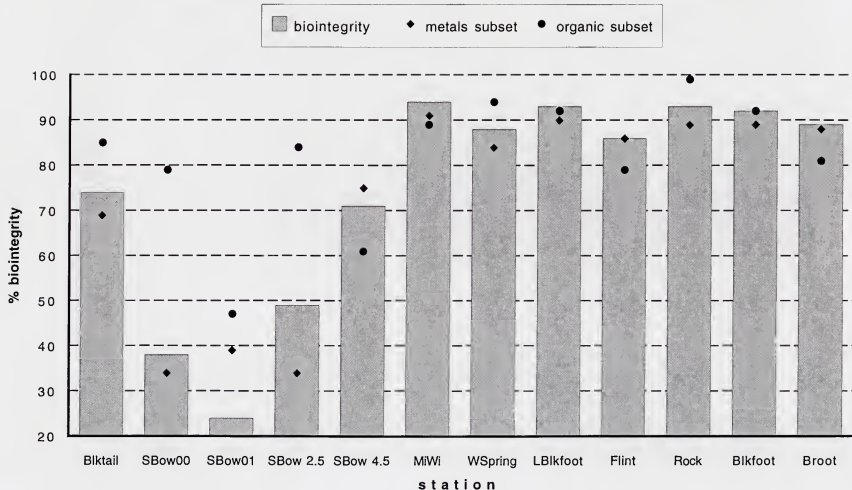
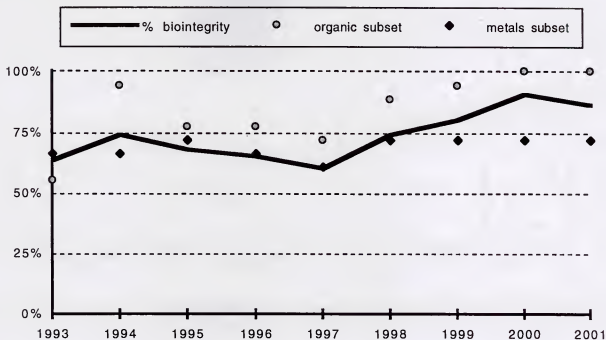


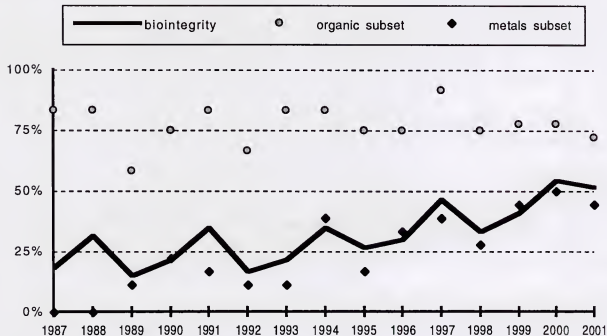
Figure 6. Mean aquatic macroinvertebrate community biointegrity in selected Clark Fork River tributaries, 1993-2001 (except Mill-Willow 1999 to 2001 only).



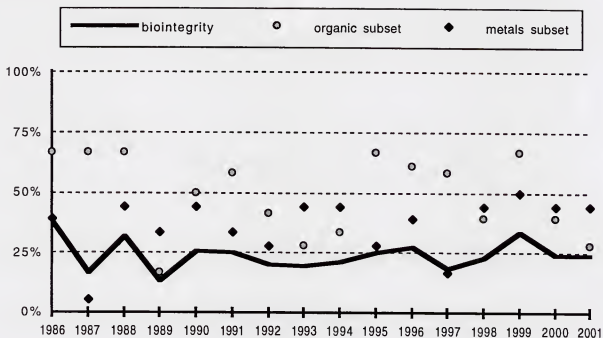
**Figure 7. Biointegrity (%) in Blacktail Creek above Grove Gulch (station SF-1), 1993-2001.**



**Figure 8. Biointegrity (%) in Silver Bow Creek above the Butte WWTP (station 00), 1987-2001.**



**Figure 9. Biointegrity (%) in Silver Bow Creek at Rocker (station 01), 1986-2001.**



**Figure 10. Biointegrity (%) in Silver Bow Creek near Opportunity (station 02.5), 1986-2001.**

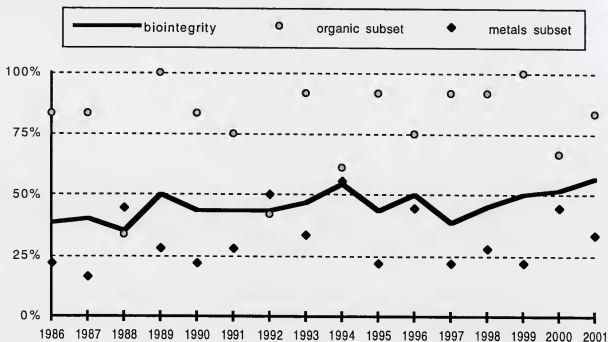


Figure 11. Biointegrity (%) in Silver Bow Creek below the Warm Springs Ponds (station 04, 1986-1991; station 04.5, 1993-2001).

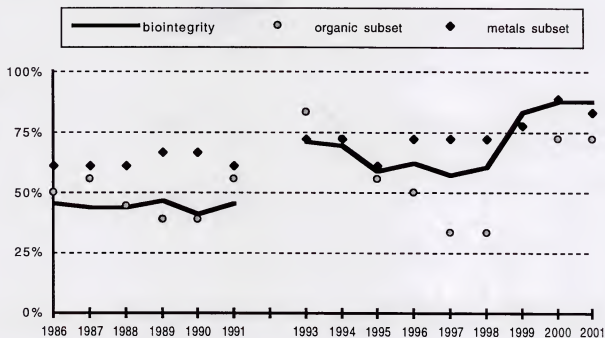
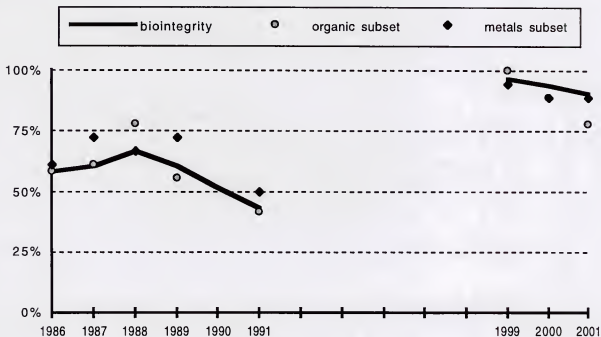
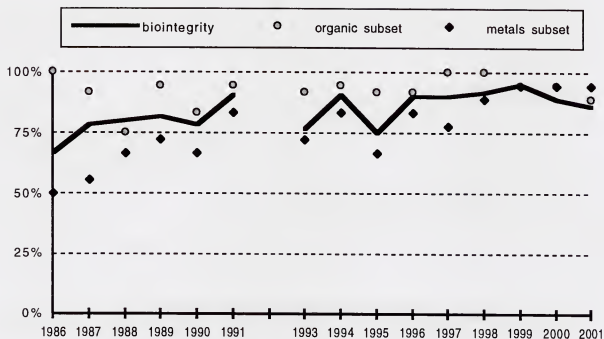


Figure 12. Biointegrity (%) in the Mill-Willow Bypass (station MW-2, 1986-1991 and 1999-2001).



**Figure 13. Biointegrity (%) in Warm Springs Creek near mouth (station 06), 1986-2001.**



**Figure 14. Biointegrity (%) in the Clark Fork River below Warm Springs Creek (station 07), 1986-2001.**

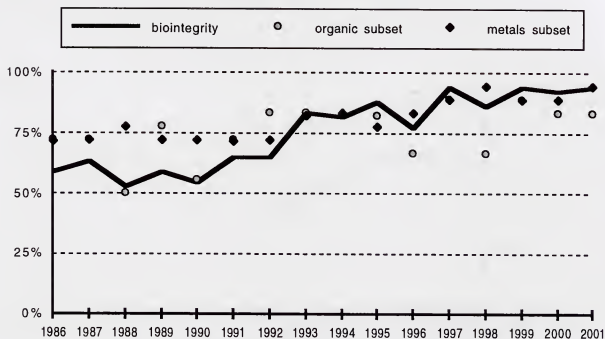


Figure 15. Biointegrity (%) in the Clark Fork River near Dempsey (station 08), 1986-1992, 1998-2001.

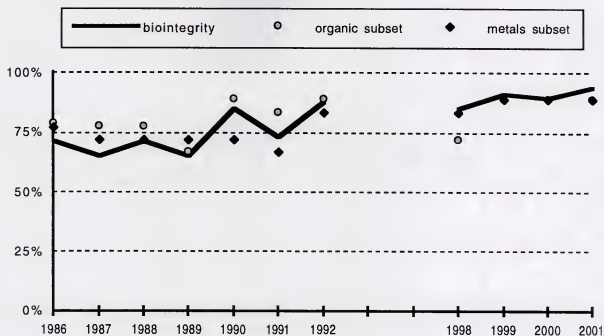
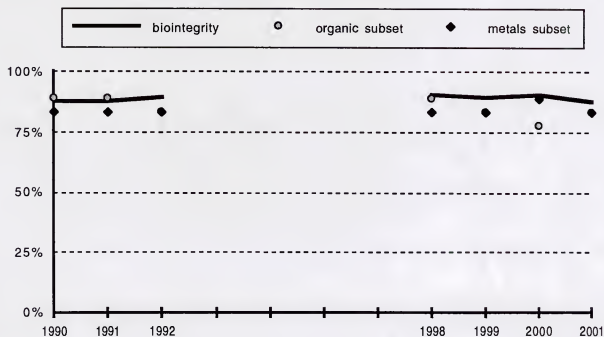
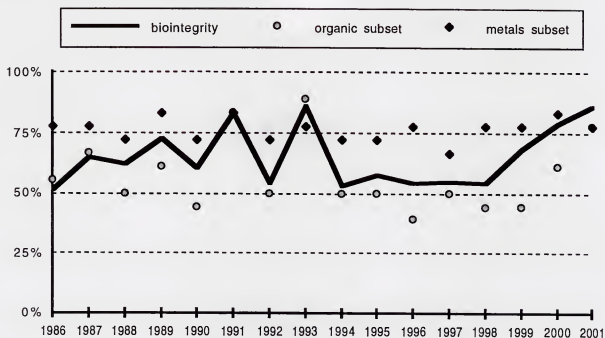


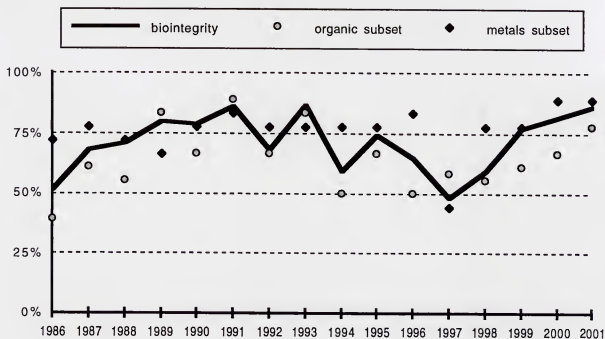
Figure 16. Biointegrity (%) in the Clark Fork River at Sager Lane (station 08.5), 1990-1992, 1998-2001.



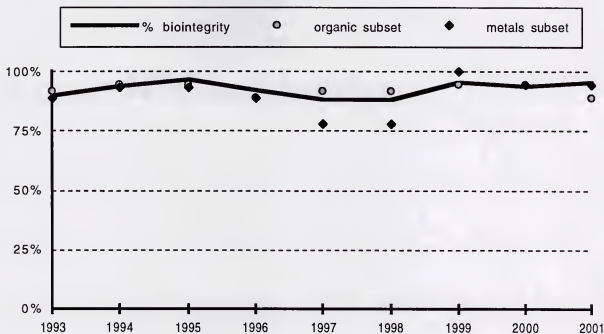
**Figure 17. Biointegrity (%) in the Clark Fork River at Deer Lodge (station 09), 1986-2001.**



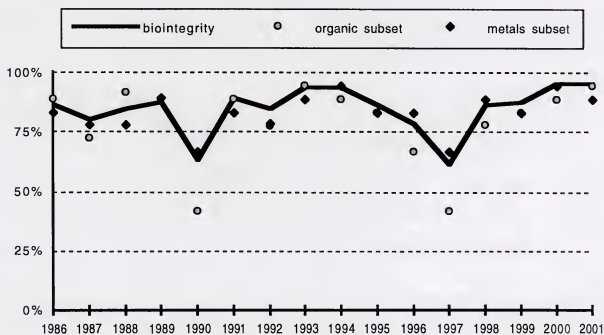
**Figure 18. Biointegrity (%) in the Clark Fork River above the Little Blackfoot River (station 10), 1986-2001.**



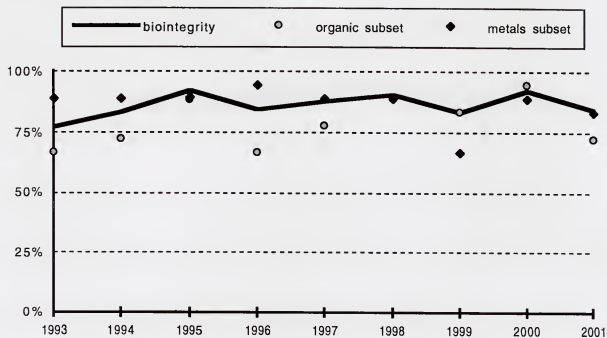
**Figure 19. Biointegrity (%) in the Little Blackfoot River near mouth (station 10.2), 1993-2001.**



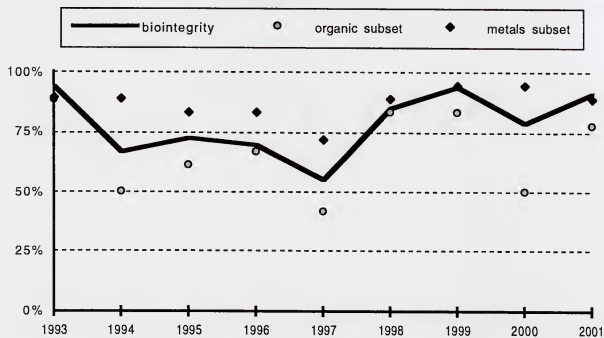
**Figure 20. Biointegrity (%) in the Clark Fork River at Gold Creek Bridge (station 11), 1986-2001.**



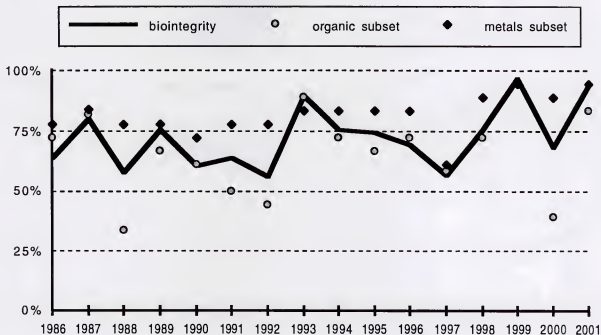
**Figure 21. Biointegrity (%) in Flint Creek at New Chicago (station 11.5), 1993-2001.**



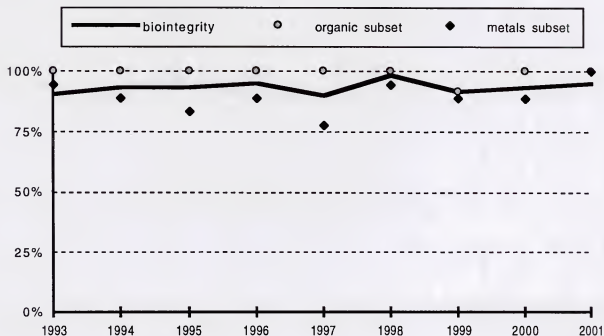
**Figure 22. Biointegrity (%) in the Clark Fork River at Bearmouth (station 11.7), 1993-2001.**



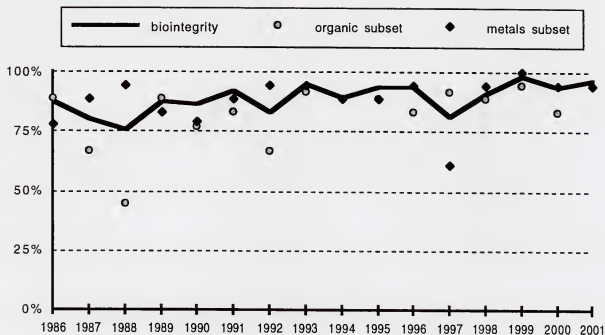
**Figure 23. Biointegrity (%) in the Clark Fork River at Bonita (station 12), 1986-2001.**



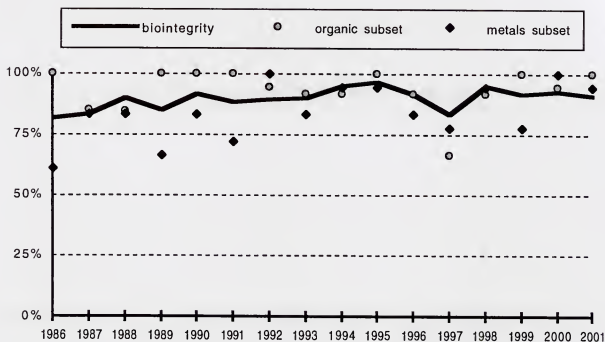
**Figure 24. Biointegrity (%) in Rock Creek near mouth (station 12.5), 1993-2001.**



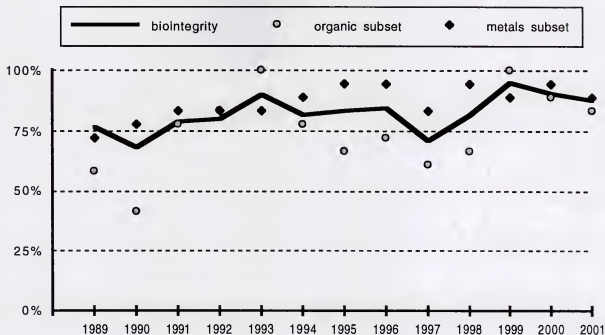
**Figure 25. Biointegrity (%) in the Clark Fork River at Turah (station 13), 1986-2001.**



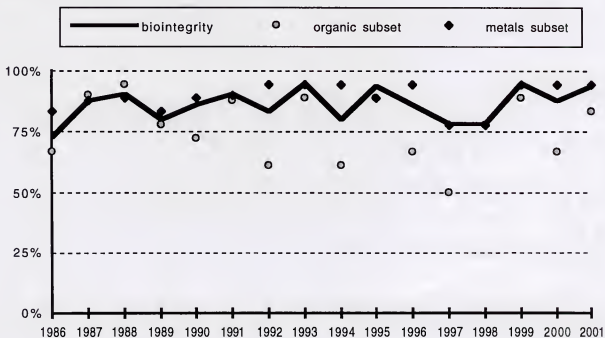
**Figure 26. Biointegrity (%) in the Blackfoot River near mouth (station 14), 1986-2001.**



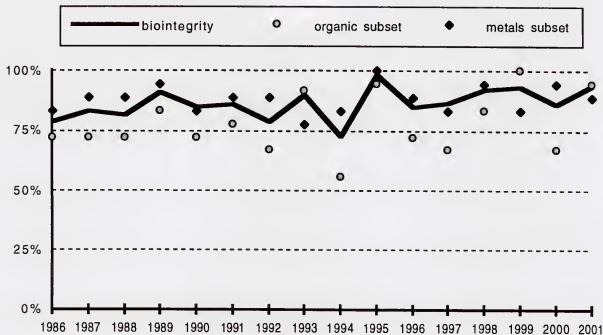
**Figure 27. Biointegrity (%) in the Clark Fork River above Missoula (station 15.5), 1989-2001.**



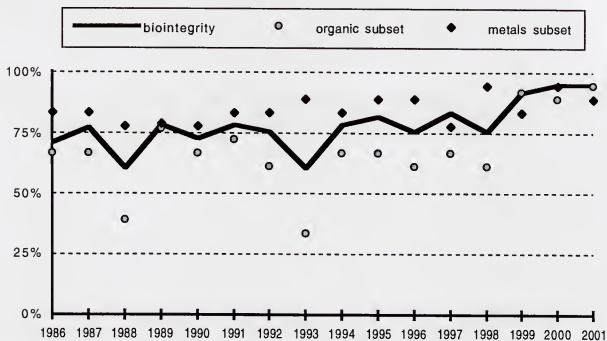
**Figure 28. Biointegrity (%) in the Clark Fork River at Shuffields (station 18), 1986-2001.**



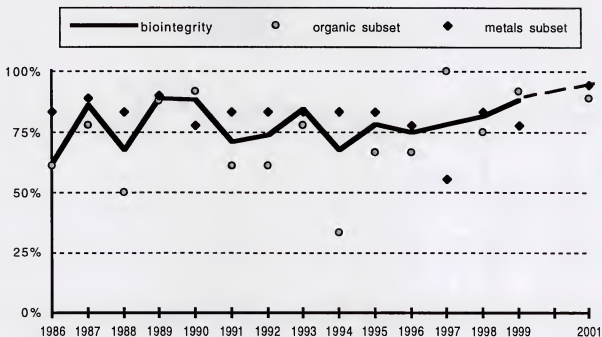
**Figure 29. Biointegrity (%) in the Bitterroot River near mouth (station 19), 1986-2001.**



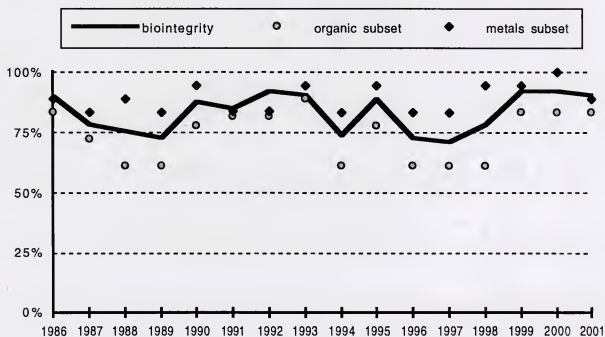
**Figure 30. Biointegrity (%) in the Clark Fork River at Harper Bridge (station 20), 1986-2001.**



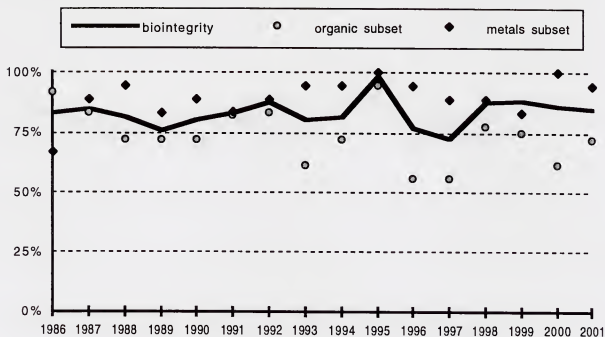
**Figure 31. Biointegrity (%) in the Clark Fork River at Huson (station 22), 1986-2001.**



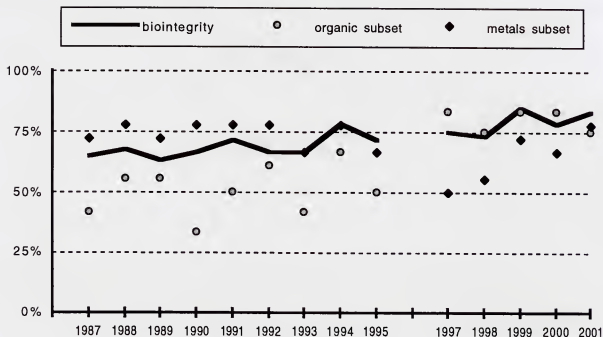
**Figure 32. Biointegrity (%) in the Clark Fork River at Superior (station 24), 1986-2001.**



**Figure 33. Bointegrity (%) in the Clark Fork River above the Flathead River (station 25), 1986-2001.**



**Figure 34. Bointegrity (%) in the Clark Fork River above Thompson Falls Reservoir (station 27), 1987-2001.**



## 5. CONCLUSIONS

### 5.1 2001 Monitoring

1. Macroinvertebrate-based bioassessments indicated no significant water quality problems at 15 Clark Fork River Basin sites during 2001. This was the 3rd straight year that the majority of sites were classified as nonimpaired. However, pollution was indicated at 12 monitoring stations.

2. Upper Silver Bow Creek remained severely impaired by metals and nutrient/organic pollution. Increased biological integrity was evident at the former Colorado Tailings site for the 5th consecutive year. Severe organic pollution was indicated at Rocker, downstream from the Butte WWTP.

3. Significant metals pollution was indicated at only 1 station (Deer Lodge) in the upper Clark Fork River during 2001. Metals-related impacts at this site were classified as slight.

4. Impacts in the remainder of the study area were primarily attributable to slight nutrient and/or organic pollution. Biological impairment was indicated in Silver Bow Creek below the Warm Springs Ponds and in the Clark Fork River from Sager Lane to the confluence of the Little Blackfoot River. Degraded riparian habitat and excessive sediment loads contributed to biological impairment and accentuated nutrient pollution at these sites. Further downstream, the Clark Fork was slightly impaired above the confluence of the Flathead River. Slight biological impairment was also indicated in Flint Creek.

### 5.2 Long-term Monitoring

1. Nutrient and organic pollution were pervasive in the Clark Fork River and caused slight to moderate biological impairment through much of the study area. Slight impacts from nutrient and organic pollution were routinely detected at the majority of sites within the Clark Fork mainstem, and in Silver Bow Creek, Flint Creek, and the lower Bitterroot River.

2. Although nutrient pollution remains the principle cause of biological impairment in the Clark Fork River, fewer stations were diagnosed as impaired by nutrients during the past 3 years. This trend was especially strong in 2001 and may indicate a biological response to reduced nutrient loading from sewage treatment facilities at Deer Lodge and Butte. Land application of effluent from the Deer Lodge Treatment Lagoon and the Butte WWTP (partial land application) began in 2000.

3. Upper Silver Bow Creek was severely impaired by metals, nutrients, and organic pollutants throughout the 15-year monitoring period. Metals were clearly the most deleterious pollutants in this reach. However, moderate to severe organic pollution was indicated downstream from the Butte WWTP. Furthermore, the Butte WWTP effluent is a major source of nutrients for Silver Bow Creek, the Warm Springs Ponds, and the upper Clark Fork River.

4. Within the Clark Fork mainstem, the reach from Deer Lodge to the Little Blackfoot River (CFR1) currently has the lowest biological integrity. Moderate impairment in this reach was due to the combined effects of nutrients, metals, sediment pollution and partial dewatering.

5. Biological integrity has improved in much of the upper Clark Fork River Basin in recent years. Significant trends of improving biointegrity were evident at Silver Bow Creek sites above the Butte WWTP and below the Warm Springs Ponds, in Warm Springs Creek and the Mill-Willow bypass, and at stations on the Clark Fork River from Warm Springs Creek downstream to Dempsey. Improved biointegrity at these sites was primarily attributable to reduced metals pollution.

6. Metals impacts have been significantly reduced in the upper Clark Fork River since the early 1990's. Prior to 1992, most sites in the upper 100 miles of the river were routinely impaired by metals pollution. Containment, treatment, and removal of metals sources in Silver Bow Creek, Warm Springs Creek, and the Mill-Willow Bypass has greatly reduced metals-related impacts in the upper Clark Fork River.

7. Since 1993, metals pollution in the Clark Fork River has generally been limited to the lower Deer Lodge Valley (CFR1). Deleterious effects to the benthic macroinvertebrate community were generally slight and were not detected in 2000. However, metals pollution was more widespread in the upper Clark Fork River during 1997 than at any time since 1986. Metals-related impacts were evident from Deer Lodge to Turah and caused moderate biological impairment in the lower Deer Lodge Valley. Increased metals pollution was attributed to increased metals loading associated with higher flows.

8. Recent temporal and spatial impairment patterns suggest the principle remaining source of metals are mine tailings stored in the Clark Fork's historic floodplain. The extent and severity of metals-related impacts appears to be influenced the amount of bank erosion and overland runoff which are clearly related to streamflow. Impacts are most readily apparent in the lower Deer Lodge Valley (CFR1).

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## **APPENDIX A:**

Macroinvertebrate checklist for the Clark Fork Basin  
with biotic and metals tolerance values

**Appendix A. Aquatic macroinvertebrates collected from the Clark Fork River Basin during August, 1986-2001 and tolerance values used to calculate biotic and metals tolerance indices.**

class	order	family	genus	species	biotic index	metals	tolerance
INSECTA							
	Coleoptera						
		Dytiscidae					7
			<i>Agabetes</i>	<i>sp.</i>			
			<i>Agabinus</i>	<i>sp.</i>			
			<i>Agabus</i>	<i>sp.</i>			
			<i>Deronectes</i>	<i>sp.</i>			
			<i>Hydroporus</i>	<i>sp.</i>			
			<i>Hydrovatus</i>	<i>sp.</i>			
			<i>Hygrotus</i>	<i>sp.</i>			
			<i>Illybius</i>	<i>sp.</i>			
			<i>Oreodytes</i>	<i>spp.</i>			
		Elmidae					
			<i>Cleptelmis</i>	<i>ornata</i>	4		4
			<i>Dubiraphia</i>	<i>sp.</i>	6		4
			<i>Heterlimnius</i>	<i>corpulentus</i>	3		3
			<i>Lara</i>	<i>avara</i>	1		1
			<i>Microcylloepus</i>	<i>sp.</i>	5		4
			<i>Narpus</i>	<i>concolor</i>	2		1
			<i>Optioservus</i>	<i>spp.</i>	5		5
			<i>Ordobrevia</i>	<i>sp.</i>	5		3
			<i>Stenelmis</i>	<i>sp.</i>	5		3
			<i>Zaitzevia</i>	<i>parvula</i>	4		3
		Halipidae					5
			<i>Brychius</i>	<i>sp.</i>			7
			<i>Halipus</i>	<i>sp.</i>			
			<i>Peltodytes</i>	<i>sp.</i>			
		Hydrophilidae					7
	Plecoptera						
		Capniidae					1
		Chloroperlidae					0
			Chloroperlinae		1		2
			<i>Kathroperla</i>	<i>perdita</i>	1		2
		Nemouridae					
			<i>Amphinemura</i>	<i>sp.</i>	2		1
			<i>Zapada</i>	<i>cinctipes</i>	3		3
			<i>Zapada</i>	<i>oregenensis</i> <i>gp.</i>	2		2
			<i>Malenka</i>	<i>sp.</i>	1		1
		Perlidae					
			<i>Calineuria</i>	<i>californica</i>	2		3
			<i>Claassenia</i>	<i>sabulosa</i>	3		3
			<i>Doroneuria</i>	<i>sp.</i>	1		3
			<i>Hesperoperla</i>	<i>pacifica</i>	1		3

Appendix A. continued.

class	order	family	genus	species	biotic index	metals tolerance
	Plecoptera	(continued)				
		Perlodidae				
			<i>Cultus</i>	<i>sp.</i>	2	2
			<i>Isoperla</i>	<i>fulva</i>	2	3
			<i>Isoperla</i>	<i>quinquepunctata</i>	2	2
			<i>Isogenoides</i>	<i>sp.</i>	3	2
			<i>Megarcys</i>	<i>sp.</i>	1	1
			<i>Skwala</i>	<i>sp.</i>	3	3
		Pteronarcidae				
			<i>Pteronarcella</i>	<i>badia</i>	3	4
			<i>Pteronarcys</i>	<i>californica</i>	2	1
		Taeniopterygidae			2	1
	Diptera					
		Chironomidae				
		Tanypodinae				
			<i>Ablabesmyia</i>	<i>sp.</i>	8	3
			<i>Alotanypus</i>	<i>= Radotanypus sp.</i>	6	8
			<i>Brundiniella</i>	<i>sp.</i>	3	7
			<i>Macropelopia</i>	<i>sp.</i>	6	5
			<i>Nilotanypus</i>	<i>sp.</i>	6	3
			<i>Thienemannimyia</i>	<i>gp.</i>	5	3
			<i>Pentaneura</i>	<i>sp.</i>	6	2
			<i>Procladius</i>	<i>sp.</i>	9	5
		Diamesinae				
			<i>Diamesa</i>	<i>sp.</i>	5	9
			<i>Pagastia</i>	<i>sp.</i>	1	9
			<i>Potthastia</i>	<i>gaedii gp.</i>	2	5
			<i>P. longimanus</i>	<i>gp.</i>	2	5
			<i>Sympotthastia</i>	<i>sp.</i>	2	4
		Prodiamesinae				
			<i>Monodiamesa</i>	<i>sp.</i>	7	5
			<i>Odontomesa</i>	<i>sp.</i>	4	5
			<i>Prodiamesa</i>	<i>sp.</i>	3	3
		Orthocladinae				
			<i>Brillia</i>	<i>sp.</i>	4	4
			<i>Cardiocladius</i>	<i>spp.</i>	5	9
			<i>Corynoneura</i>	<i>sp.</i>	7	4
			<i>Cricotopus</i>	<i>spp.</i>	7	10
			<i>C. (Nostococcladius)</i>	<i>sp.</i>	6	5
			<i>Eukiefferiella</i>	<i>spp.</i>	8	9
			<i>E. (devonica)</i>	<i>gp.</i>	8	7
			<i>Nanocladius</i>	<i>sp.</i>	3	4
			<i>Orthocladus</i>	<i>spp.</i>	6	5
			<i>Parametriochnemus</i>	<i>sp.</i>	5	4
			<i>Paraphaenocladus</i>	<i>sp.</i>	4	4
			<i>Rheocricotopus</i>	<i>sp.</i>	4	5
			<i>Symbiocladus</i>	<i>sp.</i>	4	1

**Appendix A. continued.**

class	order	family	genus	species	biotic index	metals tolerance
	Diptera	(continued)				
			<i>Synorthocladius</i>	<i>sp.</i>	2	1
			<i>Tvetenia</i>	<i>sp.</i>	5	4
		Chironominae				
		Chironomini				
			<i>Chironomus</i>	<i>sp.</i>	10	7
			<i>Cryptochironomus</i>	<i>sp.</i>	8	5
			<i>Demicryptochironomus</i>	<i>sp.</i>	8	4
			<i>Dicrotendipes</i>	<i>sp.</i>	8	5
			<i>Endochironomus</i>	<i>sp.</i>	10	6
			<i>Glyptotendipes</i>	<i>sp.</i>	10	4
			<i>Microtendipes</i>	<i>sp.</i>	6	4
			<i>Parachironomus</i>	<i>sp.</i>	10	4
			<i>Paracladopelma</i>	<i>sp.</i>	7	4
			<i>Phaenopsectra</i>	<i>sp.</i>	7	4
			<i>Polypedilum</i>	<i>spp.</i>	6	4
			<i>Psuedochironomus</i>	<i>sp.</i>	5	4
			<i>Robackia</i>	<i>sp.</i>	7	4
			<i>Stenochironomus</i>	<i>sp.</i>	5	4
			<i>Stictochironomus</i>	<i>sp.</i>	5	4
			<i>Xenochironomus</i>	<i>sp.</i>	4	0
		Tanytarsini				
			<i>Cladotanytarsus</i>	<i>sp.</i>	7	3
			<i>Krenopsectra</i>	<i>sp.</i>	4	1
			<i>Micropectra</i>	<i>spp. (including Krenop.</i>	4	1
			<i>Paratanytarsus</i>	<i>sp.</i>	6	3
			<i>Stempellina</i>	<i>sp.</i>	2	0
			<i>Sublettia</i>	<i>sp.</i>	2	0
			<i>Rheotanytarsus</i>	<i>sp.</i>	6	1
			<i>Tanytarsus</i>	<i>sp.</i>	6	3
		Tipulidae				
			<i>Antocha</i>	<i>sp.</i>	3	4
			<i>Dicranota</i>	<i>sp.</i>	3	2
			<i>Hesperoconpa</i>	<i>sp.</i>	1	1
			<i>Hexatoma</i>	<i>sp.</i>	2	2
			<i>Limnonia</i>	<i>(?) sp.</i>	3	2
			<i>Limnephila</i>	<i>sp.</i>	3	3
			<i>Ormosia</i>	<i>(?) sp.</i>	6	3
			<i>Tipula</i>	<i>sp.</i>	4	3
			<i>Rhabdomastix</i>	<i>sp.</i>	1	1
		Athericidae				
			<i>Atherix</i>	<i>pachypus</i>	4	4
		Simuliidae				
			<i>Simulium</i>	<i>(Eusimulium) spp.</i>	5	5
			<i>Simulium</i>	<i>(Psilozoa) sp.</i>	7	7

**Appendix A. continued.**

class	order	family	genus	species	biotic index	metals tolerance
Diptera (cont.)						
Empididae						
			<i>Chelifera</i>	<i>sp.</i>	5	4
			<i>Clinocera</i>	<i>sp.</i>	5	4
			<i>Hemerodromia</i>	<i>sp.</i>	6	4
Tanyteridae						
			<i>Protanyderus</i>	<i>sp.</i>	5	1
Muscidae						
			<i>Limnophora</i>	<i>sp.</i>	6	7
Ceratopogonidae						
			<i>Ceratopogoninae</i>		6	4
Culicidae						
			<i>Aedes</i>	<i>sp.</i>	7	5
Dolichopodidae					4	4
Tabanidae					6	3
Stratiomyidae						
			<i>Euparyphus</i>	<i>sp.</i>	7	4
Psychodidae						
			<i>Pericoma</i>	<i>sp.</i>	4	4
Hemiptera						
Corixidae						5
			<i>Hesperocorixa</i>	<i>laevigata</i>		
			<i>Sigara</i>	<i>sp.</i>		
Saldidae						
			<i>Salda</i>	<i>sp.</i>		
Lepidoptera						
Pyrilidae						
			<i>Petrophila</i>	<i>sp.</i>	5	3
Megaloptera						
Sialidae						
			<i>Sialis</i>	<i>sp.</i>	4	4
Odonata						
Gomphidae						
			<i>Ophiogomphus</i>	<i>sp.</i>	5	4
Zygoptera						
			<i>Ischnura</i>	<i>sp.</i>	8	4
Ephemeroptera						
Baetidae						
			<i>Acentrella</i>	<i>insignificans</i>	4	4
			<i>A.</i>	<i>turbida</i>	4	3
			<i>Pladitus</i>	<i>punctiventris</i>	6	3
			<i>B.</i>	<i>tricaudatus</i>	4	5
			<i>Callibaetis</i>	<i>sp.</i>	9	1
			<i>Centroptilum</i>	<i>sp.</i>	2	1
			<i>Dipheter</i>	<i>hageni</i>	5	1

Appendix A. continued.

class	order	family	genus	species	biotic index	metals tolerance
	Ephemeroptera	(cont)				
		Ephemerellidae				
			<i>Attenella</i>	<i>margarita</i>	3	1
			<i>Caudatella</i>	<i>heterocaudata</i>	0	0
			<i>C.</i>	<i>hystrix</i>	0	0
			<i>Drunella</i>	<i>coloradensis</i>	0	0
			<i>D.</i>	<i>doddsi</i>	1	0
			<i>D.</i>	<i>grandis</i>	2	1
			<i>Ephemerella</i>	<i>inermis</i>	4	3
			<i>Serratella</i>	<i>tibialis</i>	2	1
			<i>Timpanoga</i>	<i>hecuba</i>	2	1
		Heptageniidae				
			<i>Cinygmula</i>	<i>sp.</i>	0	0
			<i>Epeorus</i>	<i>spp.</i>	2	0
			<i>E.</i>	<i>albertae</i>	2	0
			<i>E.</i>	<i>grandis</i>	0	0
			<i>E.</i>	<i>longimanus</i>	1	0
			<i>Heptagenia</i>	<i>soltari</i>	3	1
			<i>Nixe</i>	<i>spp.</i>	4	1
			<i>Rhithrogena</i>	<i>spp.</i>	0	2
			<i>Stenonema</i>	<i>(termitum)?</i>	4	1
		Leptophlebiidae				
			<i>Paraleptophlebia</i>	<i>spp.</i>	1	1
			<i>P.</i>	<i>bicornuta</i>	2	1
			<i>P.</i>	<i>debilis</i>	1	1
		Siphonuridae				
			<i>Ameletus</i>	<i>sp.</i>	0	1
		Tricorythidae				
			<i>Tricorythodes</i>	<i>minutus</i>	4	4
	Trichoptera					
		Brachycentridae				
			<i>Amiocentrus</i>	<i>aspilus</i>	3	1
			<i>Brachycentrus</i>	<i>americanus</i>	1	4
			<i>Brachycentrus</i>	<i>occidentalis</i>	2	3
			<i>Micrasema</i>	<i>bactro</i>	1	2
		Glossosomatidae				
			<i>Agapetus</i>	<i>sp.</i>	0	2
			<i>Glossosoma</i>	<i>sp.</i>	0	2
			<i>Proptila</i>	<i>sp.</i>	1	2
		Helicopsychidae				
			<i>Helicopsyche</i>	<i>borealis.</i>	3	3
		Hydropsychidae				
			<i>Arctopsyche</i>	<i>grandis</i>	2	3
			<i>Cheumatopsyche</i>	<i>spp.</i>	5	5
			<i>Hydropsyche</i>	<i>spp.</i>	5	5
			<i>H. (H.)</i>	<i>occidentalis</i>	5	5
			<i>H. (Ceratopsyche)</i>	<i>spp.</i>	5	5

**Appendix A. continued.**

class	order	family	genus	species	biotic index	metals tolerance
Trichoptera (continued)						
			<i>H. (C.) cockerelli</i>		4	4
			<i>H. (C.) morosa?</i>		6	5
			<i>H. (C.) oslari/tana</i>		3	6
			<i>H. (C.) slossonae</i>		4	6
	Hydroptilidae					
			<i>Hydroptila</i> spp.		6	4
			<i>Leucotrichia pictipes</i>		2	1
			<i>Neotrichia</i> sp.		2	2
			<i>Ochrotrichia</i> sp.		4	3
			<i>Oxyethira</i> sp.		3	2
			<i>Zumatrichia notosa</i>		3	1
	Lepidostomatidae					
			<i>Lepidostoma</i> sp.		1	1
	Leptoceridae					
			<i>Ceraclea</i> spp.		3	1
			<i>Oecetis</i> sp.		8	3
			<i>Nectopsyche</i> sp.		3	3
			<i>Tranodes</i> sp.		6	1
	Limnephilidae					
			<i>Dicosmoecus</i> sp.		2	1
			<i>Ecclisomyia</i> sp.		4	2
			<i>Limnephilus</i> sp.		3	2
			<i>Onocosmoecus</i> sp.		3	2
			<i>Neophylax</i> sp.		3	2
			<i>Psychoglypha</i> sp.		0	2
	Philopotamidae					
			<i>Wormaldia</i> sp.		0	1
	Phryganeidae					
			<i>Phryganea</i> sp.		4	?
	Polycentropidae					
			<i>Neureclipsis</i> sp.		6	1
			<i>Polycentropus</i> sp.		6	1
	Psychomyiidae					
			<i>Psychomyia</i> sp.		2	1
	Rhyacophilidae					
			<i>Rhyacophila angelita</i> gp.		0	1
			<i>R. coloradensis</i> gp.		0	1
			<i>R. brunnea</i> gp.		2	1
ANNELIDA						
	Oligochaeta					
	Branchiobdellidae					
			<i>Enchytraeidae</i>		4	1
			<i>Lumbricidae</i>		4	1
			<i>Lumbriculidae</i>		4	1
			<i>Naididae</i>		8	5
			<i>Tubificidae</i>		10	6

**Appendix A. concluded.**

class	order	family	genus	species	biotic index	metals tolerance
			Hirudinea			
			Erpobdellidae		8	4
			Glossophoniidae		9	4
				<i>Glossiphonia complanata</i>	9	4
				<i>Helobdella stagnalis</i>	10	4
CRUSTACEA						
			Amphipoda			
			Gammaridae			
				<i>Gammarus sp.</i>	4	1
			Talitridae			
				<i>Hyaella azteca</i>	8	3
			Isopoda			
			Asellidae			
				<i>Caecidotea sp. (Asellus)</i>	8	5
			Decapoda			
			Astacidae			
				<i>Pacifasticus sp.</i>	6	3
MOLLUSCA						
			Gastropoda			
			Ancyclidae			
				<i>Ferrissia rivularis</i>	6	1
			Lymnaeidae			
				<i>Fossaria spp.</i>	6	3
				<i>Stagnicola sp.</i>	6	3
				<i>Fisherola nutalli</i>	3	1
				<i>Radix auricularia</i>	8	1
			Physidae			
				<i>Physella sp.</i>	8	4
			Planorbidae			
				<i>Gyraulus sp.</i>	8	3
			Valvatidae			
				<i>Valvata humeralis</i>	3	1
			Pelecypoda			
			Sphaeriidae		8	3
				<i>Shaerium sp.</i>	8	3
				<i>Pisidium sp.</i>	8	3
TURBELLARIA					4	3
NEMATODA					5	5
NEMATOMORPHA					5	5
PORIFERA					0	0
ACARI					5	5
CNIDARIA				<i>Hydra sp.</i>	8	3

## **APPENDIX B:**

2001 Clark Fork Basin macroinvertebrate data

B.1 MACROINVERTEBRATE DATA								
BLACKTAIL CREEK above Grove Gulch - STATION SF-1 -8 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						25%	213	
<i>Optioservus spp.</i>	157	87	64	72	380	11%	95.0	42.4
<i>Zaitzevia sp.</i>	13	3	14	19	49	1%	12.3	6.7
<i>Cleptelmis ornata</i>	118	52	77	63	310	9%	77.5	28.9
<i>Narpus concolor</i>	0	0	3	1	4	0%	1.0	1.4
<i>Agabus sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Brychius sp.</i>	50	27	13	13	103	3%	25.8	17.5
<i>Oreodytes spp.</i>	0	0	3	1	4	0%	1.0	1.4
DIPTERA						51%	427	
<i>Thienemannimyia gp.</i>	1	0	1	0	2	0%	0.5	0.6
<i>Diamesa spp.</i>	0	0	0	1	1	0%	0.3	0.5
<i>Pagastia sp</i>	222	158	121	151	652	19%	163.0	42.5
<i>Brillia sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Cardiocladius spp.</i>	0	1	0	0	1	0%	0.3	0.5
<i>Cricotopus spp.</i>	0	0	4	7	11	0%	2.8	3.4
<i>Eukiefferiella spp.</i>	0	3	1	1	5	0%	1.3	1.3
<i>Orthocladius spp.</i>	21	10	12	23	66	2%	16.5	6.5
<i>Parametriochnemus sp.</i>	2	1	3	1	7	0%	1.8	1.0
<i>Tvetenia sp.</i>	0	1	3	9	13	0%	3.3	4.0
<i>Rheotanytarsus sp.</i>	25	1	4	7	37	1%	9.3	10.8
<i>Tanytarsus sp.</i>	0	0	2	0	2	0%	0.5	1.0
<i>Micropsectra spp.</i>	98	78	29	87	292	9%	73.0	30.5
<i>Dicranota sp.</i>	1	1	0	2	4	0%	1.0	0.8
<i>Hexatoma sp.</i>	1	0	4	4	9	0%	2.3	2.1
<i>Tipula sp.</i>	1	0	0	0	1	0%	0.3	0.5
<i>Simulium spp.</i>	101	157	64	267	589	17%	147.3	88.5
<i>Limnophora sp.</i>	0	6	0	2	8	0%	2.0	2.8
<i>Pericoma sp.</i>	2	0	1	4	7	0%	1.8	1.7
EPHEMEROPTERA						12%	97	
<i>Baetis tricaudatus</i>	108	28	25	37	198	6%	49.5	39.3
<i>Centroptilum sp.</i>	0	0	6	1	7	0%	1.8	2.9
<i>Dipheter hageni</i>	1	0	10	5	16	0%	4.0	4.5
<i>Ephemerella inermis</i>	0	0	2	0	2	0%	0.5	1.0
<i>Nixe sp.</i>	6	4	28	4	42	1%	10.5	11.7
<i>Paraleptophlebia sp.</i>	75	12	28	7	122	4%	30.5	31.0
<i>Tricorythodes minutus</i>	0	0	2	0	2	0%	0.5	1.0
PLECOPTERA						2%	14	
<i>Malenka sp.</i>	4	3	0	3	10	0%	2.5	1.7
<i>Skwala sp.</i>	0	2	0	0	2	0%	0.5	1.0
<i>Pteronarcella badia</i>	8	3	4	11	26	1%	6.5	3.7
<i>Chloroperlinae</i>	2	3	1	10	16	0%	4.0	4.1

B.1 MACROINVERTEBRATE DATA								
BLACKTAIL CREEK above Grove Gulch - STATION SF-1 - 8 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TRICHOPTERA						10%	82	
<i>Cheumatopsyche</i> spp.	0	0	0	1	1	0%	0.3	0.5
<i>Hydropsyche</i> <i>oslari</i> ?	20	133	5	90	248	7%	62.0	60.1
<i>Neophylax</i> sp.	1	4	0	2	7	0%	1.8	1.7
<i>Hydroptila</i> spp.	6	5	8	12	31	1%	7.8	3.1
<i>Lepidostoma</i> sp.	4	2	7	24	37	1%	9.3	10.0
<i>Brachycentrus occidentalis</i>	1	1	0	0	2	0%	0.5	0.6
ANNELIDA						0%	4	
Lumbricidae	0	0	0	1	1	0%	0.3	0.5
Naididae	11	0	2	0	13	0%	3.3	5.3
Tubificidae	0	0	1	0	1	0%	0.3	0.5
MOLLUSCA						1%	7	
<i>Physella</i> sp.	4	1	3	11	19	1%	4.8	4.3
<i>Fossaria</i> sp.	0	0	0	1	1	0%	0.3	0.5
<i>Pisidium</i> sp.	3	1	4	0	8	0%	2.0	1.8
ID's by D. McGuire								
TOTAL ORGANISMS	1067	788	561	955	3371		843	220
TAXA RICHNESS	30	29	37	36	49		33.0	4.1
SHAN. DIVERSITY	3.54	3.28	3.90	3.58	3.74		3.58	0.25
BIOTIC INDEX	3.66	3.77	3.71	4.10	3.82		3.81	0.20
EPT RICHNESS	12	12	12	13	17		12.3	0.5
% R.A. DOMINANT	21%	20%	22%	28%	19%		23%	3.6%
% R.A. FILTERERS	14%	37%	13%	38%	26%		26%	14%
METALS TOLERANCE	5.06	5.63	4.99	5.31	5.25		5.25	0.29
Baetidae/Ephemeroptera	0.57	0.64	0.41	0.80	0.57		0.60	0.16
Hydropsychinae/Trichoptera	0.63	0.92	0.25	0.71	0.76		0.62	0.28
EPT / (EPT + CHIR.)	0.39	0.44	0.41	0.42	0.41		0.42	0.02
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	1	1	0	1	0		0.8	0.5
# SAND TOLERANT TAXA	4	3	5	5	5		4.3	1.0
# FINE SED TOLERANT TAXA	10	9	11	12	17		10.5	1.3
% SAND TOLERANT	27%	18%	29%	17%	22%		23%	6%
% FINE SED TOLERANT	14%	7%	16%	8%	11%		11%	5%
SEDIMENT TOLERANT INDEX	6.86	6.58	7.02	6.69	6.77		6.79	0.19
FSBI	65	59	59	63	85		61.5	3.0

B.2 MACROINVERTEBRATE DATA								
SILVER BOW CREEK above Butte WWTP - STATION 00 -8 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						3%	43	
<i>Optioservus</i> spp.	13	47	44	23	127	2%	31.8	16.4
<i>Zaitzevia</i> sp.	3	0	0	0	3	0%	0.8	1.5
<i>Cleptelmis omata</i>	1	2	1	1	5	0%	1.3	0.5
<i>Agabus</i> sp.	0	0	7	2	9	0%	2.3	3.3
<i>Deronectes</i> sp.	1	0	18	3	22	0%	5.5	8.4
Hydrophilidae	0	0	1	0	1	0%	0.3	0.5
<i>Brychius</i> sp.	0	1	2	0	3	0%	0.8	1.0
DIPTERA						89%	1131	
<i>Radotanyus</i> sp.	0	0	1	0	1	0%	0.3	0.5
<i>Thienemannimyia</i> sp.	17	6	62	22	107	2%	26.8	24.4
<i>Pagastia</i> sp.	44	44	56	55	199	4%	49.8	6.7
<i>Cardiocladius</i> spp.	33	7	0	13	53	1%	13.3	14.2
<i>Cricotopus</i> spp.	334	471	541	825	2171	43%	542.8	206.9
<i>Eukiefferiella</i> spp.	24	11	1	58	94	2%	23.5	24.9
<i>Nanocladius</i> sp.	0	0	6	0	6	0%	1.5	3.0
<i>Orthocladius</i> spp.	2	0	13	20	35	1%	8.8	9.4
<i>Parametricnemos</i> sp.	1	6	0	6	13	0%	3.3	3.2
<i>Tvetenia</i> sp.	2	0	0	0	2	0%	0.5	1.0
<i>Cryptochironomus</i> sp.	0	0	1	0	1	0%	0.3	0.5
<i>Phaenopsectra</i> sp.	1	1	38	0	40	1%	10.0	18.7
<i>Micropsectra</i> spp.	0	1	0	0	1	0%	0.3	0.5
<i>Antocha</i> sp.	1	0	0	0	1	0%	0.3	0.5
<i>Dicranota</i> sp.	3	10	16	12	41	1%	10.3	5.4
<i>Tipula</i> sp.	4	14	38	24	80	2%	20.0	14.5
<i>Simulium</i> (Psilozoa)	219	997	63	381	1660	33%	415.0	409.1
<i>Limnophora</i> sp.	5	3	6	2	16	0%	4.0	1.8
<i>Chelifera</i> sp.	1	0	0	0	1	0%	0.3	0.5
<i>Pericoma</i> sp.	0	1	0	0	1	0%	0.3	0.5
EPHEMEROPTERA						0%	0	
<i>Baetis tricaudatus</i>	0	1	0	0	1	0%	0.3	0.5
LEPIDOPTERA								
<i>Petrophila</i> sp.	0	0	2	0	2	0%	0.5	1.0
TRICHOPTERA						3%	35	
<i>Cheumatopsyche</i> spp.	1	7	4	6	18	0%	4.5	2.6
<i>Hydropsyche occidentalis</i>	2	1	0	0	3	0%	0.8	1.0
<i>Hydropsyche oslari</i> ?	20	11	7	17	55	1%	13.8	5.9
<i>Dicosmoecus</i> sp.	1	0	0	0	1	0%	0.3	0.5
<i>Oecetis</i> sp.	0	0	1	0	1	0%	0.3	0.5
<i>Brachycentrus occidentalis</i>	6	22	29	5	62	1%	15.5	11.9

B.2 MACROINVERTEBRATE DATA								
SILVER BOW CREEK above Butte WWTP - STATION 00 -8 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
ANNELIDA						4%	48	
Tubificidae	30	29	38	91	188	4%	47.0	29.6
Erpobdellidae	0	0	3	0	3	0%	0.8	1.5
MOLLUSCA						1%	16	
<i>Physella</i> sp.	1	0	11	0	12	0%	3.0	5.4
<i>Fossaria</i> sp.	3	4	40	6	53	1%	13.3	17.9
OTHER								
Turbellaria	2	0	0	0	2	0%	0.5	1.0
ID's by D. McGuire								
TOTAL ORGANISMS	775	1697	1050	1572	5094		1274	435
TAXA RICHNESS	28	23	28	20	40		24.8	3.9
SHAN. DIVERSITY	2.59	1.83	2.91	2.26	2.54		2.40	0.46
BIOTIC INDEX	6.40	6.66	6.11	6.74	6.53		6.48	0.29
EPT RICHNESS	5	5	4	3	7		4.3	1.0
% R.A. DOMINANT	43%	59%	52%	52%	43%		51%	6.4%
% R.A. FILTERERS	32%	61%	10%	26%	35%		32%	21%
METALS TOLERANCE	8.21	7.66	7.56	8.40	7.95		7.96	0.41
Baetidae/Ephemeroptera	1.00	1.00	1.00	1.00	1.00		1.00	0.00
Hydropsychinae/Trichoptera	0.80	0.46	0.27	0.82	0.55		0.59	0.27
EPT / (EPT + CHIR.)	0.06	0.07	0.05	0.03	0.05		0.05	0.02
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	0	0	0	0	0		0.0	0.0
# SAND TOLERANT TAXA	4	2	3	2	5		2.8	1.0
# FINE SED TOLERANT TAXA	10	9	16	8	18		10.8	3.6
% SAND TOLERANT	2%	3%	4%	2%	3%		3%	1%
% SEDIMENT TOLERANT	6%	4%	22%	9%	10%		10%	8%
SEDIMENT TOLERANT INDEX	7.04	7.02	7.14	7.19	7.10		7.10	0.08
FSBI	50	37	26	26	56		34.8	11.4



B.3 MACROINVERTEBRATE DATA								
SILVER BOW CREEK at Rocker - STATION 01 - 8 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	1605	3250	2393	1831	9079		2270	733
TAXA RICHNESS	21	15	19	12	28		16.8	4.0
SHAN. DIVERSITY	1.09	1.07	0.77	1.17	1.06		1.03	0.18
BIOTIC INDEX	6.94	7.01	7.00	7.05	7.00		7.00	0.05
EPT RICHNESS	2	0	0	0	2		0.5	1.0
% R.A. DOMINANT	84%	85%	89%	79%	85%		84%	4.2%
% R.A. FILTERERS	84%	85%	89%	79%	85%		84%	4%
METALS TOLERANCE	7.23	6.95	6.93	7.31	7.07		7.10	0.19
Baetidae/Ephemeroptera	1.00	1.00	1.00	1.00	1.00		1.00	0.00
Hydropsychinae/Trichoptera	0.83	1.00	1.00	1.00	1.00		0.96	0.08
EPT / (EPT + CHIR.)	0.02	0.00	0.00	0.00	0.00		0.01	0.01
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	0	0	0	0	0		0.0	0.0
# SAND TOLERANT TAXA	1	0	1	1	1		0.8	0.5
# FINE SED TOLERANT TAXA	9	7	9	3	15		7.0	2.8
% SAND TOLERANT	0%	0%	0%	0%	0%		0%	0%
% SEDIMENT TOLERANT	3%	6%	4%	4%	5%		4%	1%
SEDIMENT TOLERANT INDEX	7.07	7.16	7.10	7.12	7.12		7.11	0.04
FSBI	14	6	11	6	19		9.3	3.9



B.4 MACROINVERTEBRATE DATA								
SILVER BOW CREEK near Opportunity - STATION 02.5 -8 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	577	342	251	192	1362		341	169
TAXA RICHNESS	18	19	10	12	28		14.8	4.4
SHAN. DIVERSITY	1.79	2.11	2.03	2.11	2.03		2.01	0.15
BIOTIC INDEX	2.86	3.01	2.89	3.27	2.96		3.01	0.19
EPT RICHNESS	7	6	3	4	11		5.0	1.8
% R.A. DOMINANT	60%	49%	50%	47%	54%		52%	6.0%
% R.A. FILTERERS	67%	54%	59%	54%	60%		59%	6%
METALS TOLERANCE	6.89	7.08	7.01	7.19	7.00		7.04	0.12
Baetidae/Ephemeroptera	1.00	0.00	1.00	1.00	0.25		0.75	0.50
Hydropsychinae/Trichoptera	0.96	0.93	0.85	0.91	0.93		0.91	0.05
EPT / (EPT + CHIR.)	0.66	0.56	0.60	0.55	0.61		0.59	0.05
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	0	0	0	0	0		0.0	0.0
# SAND TOLERANT TAXA	2	2	2	1	3		1.8	0.5
# FINE SED TOLERANT TAXA	3	8	0	2	10		3.3	3.4
% SAND TOLERANT	1%	1%	1%	1%	1%		1%	0%
% SEDIMENT TOLERANT	1%	3%	0%	1%	1%		1%	1%
SEDIMENT TOLERANT INDEX	5.70	5.87	5.67	5.85	5.76		5.77	0.10
FSBI	50	42	26	36	72		38.5	10.1

B.5 MACROINVERTEBRATE DATA								
SILVER BOW CREEK below Warm Springs Ponds - STATION 04.5 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						19%	599	
<i>Optioservus</i> spp.	740	516	481	506	2243	18%	560.8	120.4
<i>Zaitzevia</i> sp.	50	26	22	53	151	1%	37.8	16.0
<i>Cleptelmis ornata</i>	0	0	0	1	1	0%	0.3	0.5
DIPTERA						9%	289	
<i>Thienemannimyia</i> gp.	16	21	21	14	72	1%	18.0	3.6
<i>Pentaneura</i> sp.	1	1	2	1	5	0%	1.3	0.5
<i>Pagastia</i> sp.	7	19	18	32	76	1%	19.0	10.2
<i>Poithastia</i> spp.	0	0	2	0	2	0%	0.5	1.0
<i>Cardiocladius</i> spp.	11	1	30	24	66	1%	16.5	13.0
<i>Cricotopus</i> spp.	3	4	6	32	45	0%	11.3	13.9
<i>Cricotopus nostococcladius</i>	1	2	0	0	3	0%	0.8	1.0
<i>Eukiefferiella</i> spp.	11	1	2	23	37	0%	9.3	10.2
<i>Orthocladus</i> spp.	10	21	1	0	32	0%	8.0	9.8
<i>Parametrioctenemus</i> sp.	1	14	40	6	61	0%	15.3	17.3
<i>Tvetenia</i> sp.	121	69	182	149	521	4%	130.3	47.8
<i>Cryptochironomus</i> sp.	0	0	0	1	1	0%	0.3	0.5
<i>Microtendipes</i> sp.	1	0	1	1	3	0%	0.8	0.5
<i>Polypedilum</i> spp.	20	12	11	43	86	1%	21.5	14.9
<i>Rheotanytarsus</i> sp.	12	2	20	3	37	0%	9.3	8.5
<i>Micropsectra</i> spp.	4	6	1	1	12	0%	3.0	2.4
<i>Antocha</i> sp.	3	4	6	2	15	0%	3.8	1.7
<i>Hexatoma</i> sp.	0	1	0	1	2	0%	0.5	0.6
<i>Tipula</i> sp.	0	1	3	0	4	0%	1.0	1.4
<i>Simulium</i> spp.	11	7	45	3	66	1%	16.5	19.3
<i>Limnophora</i> sp.	0	1	4	0	5	0%	1.3	1.9
<i>Hemerodromia</i> sp.	2	0	2	1	5	0%	1.3	1.0
EPHEMEROPTERA						9%	277	
<i>Baetis tricaudatus</i>	133	126	186	177	622	5%	155.5	30.4
<i>Dipheter hageni</i>	4	40	2	11	57	0%	14.3	17.6
<i>Attenella margarita</i>	0	5	3	0	8	0%	2.0	2.4
<i>Nixe</i> sp.	0	0	1	0	1	0%	0.3	0.5
<i>Paraleptophlebia</i> sp.	2	11	5	10	28	0%	7.0	4.2
<i>Tricorythodes minutus</i>	27	157	141	65	390	3%	97.5	61.8
LEPIDOPTERA								
<i>Petrophila</i> sp.	8	21	15	12	56	0%	14.0	5.5

B.5 MACROINVERTEBRATE DATA								
SILVER BOW CREEK below Warm Springs Ponds - STATION 04.5 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						0%	2	
<i>Hesperoperla pacifica</i>	0	1	0	0	1	0%	0.3	0.5
<i>Skwala sp.</i>	1	1	1	1	4	0%	1.0	0.0
<i>Isoperla sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Pteronarcella badia</i>	0	0	2	1	3	0%	0.8	1.0
TRICHOPTERA						39%	1215	
<i>Cheumatopsyche spp.</i>	324	225	617	521	1687	14%	421.8	179.1
<i>Hydropsyche occidentalis</i>	253	402	427	490	1572	13%	393.0	100.4
<i>Hydropsyche (C) cockerelli</i>	39	35	64	67	205	2%	51.3	16.6
<i>Hydropsyche (C) nr. morosa</i>	0	0	0	1	1	0%	0.3	0.5
<i>Hydroptila spp.</i>	77	84	122	75	358	3%	89.5	22.0
<i>Ochrotrichia sp.</i>	249	111	256	360	976	8%	244.0	102.2
<i>Lepidostoma sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Oecetis sp.</i>	4	9	10	7	30	0%	7.5	2.6
<i>Brachycentrus occidentalis</i>	2	7	7	3	19	0%	4.8	2.6
<i>Helicopsyche borealis</i>	0	7	1	1	9	0%	2.3	3.2
ANNELIDA						0%	3	
Lumbricidae	0	0	0	1	1	0%	0.3	0.5
Naididae	0	1	2	0	3	0%	0.8	1.0
Tubificidae	0	3	1	1	5	0%	1.3	1.3
Erpobdellidae	0	0	1	0	1	0%	0.3	0.5
CRUSTACEA								
<i>Hyalella azteca</i>	157	783	1300	364	2604	21%	651.0	505.0
<i>Gammarus sp.</i>	2	16	22	15	55	0%	13.8	8.4
<i>Caecidotea sp.</i>	1	2	19	31	53	0%	13.3	14.4
MOLLUSCA						0%	6	
<i>Physella sp.</i>	0	2	0	1	3	0%	0.8	1.0
<i>Gyraulus sp.</i>	0	0	0	20	20	0%	5.0	10.0
<i>Pisidium sp.</i>	0	0	1	0	1	0%	0.3	0.5
OTHER								
Turbellaria	4	1	0	0	5	0%	1.3	1.9
ID's by D. McGuire								

B.5 MACROINVERTEBRATE DATA								
SILVER BOW CREEK below Warm Springs Ponds - STATION 04.5 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	2312	2779	4108	3132	12331		3083	762
TAXA RICHNESS	36	43	47	43	57		42.3	4.6
SHAN. DIVERSITY	3.30	3.39	3.34	3.62	3.54		3.41	0.14
BIOTIC INDEX	5.05	5.69	5.82	5.20	5.49		5.44	0.38
EPT RICHNESS	12	15	18	15	20		15.0	2.4
% R.A. DOMINANT	32%	28%	32%	17%	21%		27%	7.2%
% R.A. FILTERERS	28%	24%	29%	35%	29%		29%	4%
METALS TOLERANCE	4.51	4.12	4.09	4.48	4.27		4.30	0.23
Baetidae/Ephemeroptera	0.83	0.49	0.56	0.71	0.61		0.65	0.15
Hydropsychinae/Trichoptera	0.65	0.75	0.74	0.71	0.71		0.71	0.05
EPT / (EPT + CHIR.)	0.84	0.88	0.85	0.84	0.85		0.85	0.02
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	0	1	0	0	0		0.3	0.5
# SAND TOLERANT TAXA	6	8	7	9	9		7.5	1.3
# FINE SED TOLERANT TAXA	4	8	13	8	16		8.3	3.7
% SAND TOLERANT	41%	49%	45%	30%	41%		41%	8%
SEDIMENT TOLERANT INDEX	15%	15%	19%	20%	18%		0.17	0.03
SEDIMENT TOLERANT INDEX	6.37	6.67	6.85	6.39	6.60		6.57	0.23
FSBI	65	80	81	75	98		75.3	7.3

B.6 MACROINVERTEBRATE DATA								
MILL-WILLOW BYPASS - STATION MW-2 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						27%	842	
<i>Optioservus spp.</i>	767	480	1070	618	2935	23%	733.8	253.0
<i>Zaitzevia sp.</i>	21	69	157	181	428	3%	107.0	74.9
<i>Cleptelmis ornata</i>	0	1	0	0	1	0%	0.3	0.5
<i>Agabus sp.</i>	0	1	0	0	1	0%	0.3	0.5
<i>Oreodytes spp.</i>	1	0	0	0	1	0%	0.3	0.5
DIPTERA						28%	884	
<i>Thienemannimyia gp.</i>	18	3	43	23	87	1%	21.8	16.5
<i>Pentaneura sp.</i>	0	6	3	2	11	0%	2.8	2.5
<i>Pagastia sp.</i>	23	17	21	7	68	1%	17.0	7.1
<i>Cardiocladius spp.</i>	0	1	20	12	33	0%	8.3	9.5
<i>Cricotopus spp.</i>	0	0	4	1	5	0%	1.3	1.9
<i>Cricotopus nostococcladius</i>	6	1	0	1	8	0%	2.0	2.7
<i>Eukiefferiella spp.</i>	0	1	2	0	3	0%	0.8	1.0
<i>Orthocladus spp.</i>	2	4	1	2	9	0%	2.3	1.3
<i>Parametriochnemus sp.</i>	5	0	266	61	332	3%	83.0	125.1
<i>Tveteria sp.</i>	14	18	87	67	186	1%	46.5	36.2
<i>Cryptochironomus sp.</i>	0	1	0	0	1	0%	0.3	0.5
<i>Microtendipes sp.</i>	0	1	0	0	1	0%	0.3	0.5
<i>Polypedilum spp.</i>	1	0	5	2	8	0%	2.0	2.2
<i>Rheotanytarsus spp.</i>	27	38	40	33	138	1%	34.5	5.8
<i>Micropsectra spp.</i>	7	2	4	97	110	1%	27.5	46.4
<i>Antocha sp.</i>	6	0	0	0	6	0%	1.5	3.0
<i>Hexatoma sp.</i>	4	4	8	1	17	0%	4.3	2.9
<i>Tipula sp.</i>	2	0	3	0	5	0%	1.3	1.5
<i>Simulium spp.</i>	94	372	912	1122	2500	20%	625.0	474.5
<i>Limnophora sp.</i>	0	0	3	1	4	0%	1.0	1.4
<i>Pericoma</i>	1	0	0	0	1	0%	0.3	0.5
<i>Hemerodromia sp.</i>	1	0	2	0	3	0%	0.8	1.0
EPHEMEROPTERA						26%	828	
<i>Baetis tricaudatus</i>	113	55	401	126	695	6%	173.8	154.6
<i>Pladitus punctiventris</i>	2	3	2	12	19	0%	4.8	4.9
<i>Diphetor hageni</i>	36	24	67	30	157	1%	39.3	19.1
<i>Attenella margarita</i>	4	1	2	1	8	0%	2.0	1.4
<i>Nixe sp.</i>	4	1	2	4	11	0%	2.8	1.5
<i>Paraleptophlebia sp.</i>	101	75	151	42	369	3%	92.3	46.0
<i>Tricorythodes minutus</i>	521	482	885	163	2051	16%	512.8	295.5
PLECOPTERA						0%	5	
<i>Hesperoperla pacifica</i>	0	0	1	1	2	0%	0.5	0.6
<i>Skwala sp.</i>	1	0	1	1	3	0%	0.8	0.5
<i>Pteronarcella badia</i>	0	2	4	7	13	0%	3.3	3.0

B.6 MACROINVERTEBRATE DATA								
MILL-WILLOW BYPASS - STATION MW-2 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TRICHOPTERA						17%	530	
<i>Cheumatopsyche spp.</i>	50	50	105	62	267	2%	66.8	26.1
<i>Hydropsyche occidentalis</i>	23	51	159	96	329	3%	82.3	59.3
<i>Hydropsyche (C) cockerelli</i>	2	21	113	41	177	1%	44.3	48.5
<i>Hydropsyche (C) nr. morosa</i>	4	11	20	2	37	0%	9.3	8.1
<i>Hydropsyche oslari ?</i>	7	1	41	7	56	0%	14.0	18.2
<i>Hydroptila spp.</i>	116	86	194	130	526	4%	131.5	45.5
<i>Ochrotrichia sp.</i>	6	27	103	29	165	1%	41.3	42.5
<i>Lepidostoma sp.</i>	1	0	1	1	3	0%	0.8	0.5
<i>Oecetis sp.</i>	15	2	1	10	28	0%	7.0	6.7
<i>Wormaldia sp.</i>	1	1	3	2	7	0%	1.8	1.0
<i>Brachycentrus occidentalis</i>	13	20	38	29	100	1%	25.0	10.9
<i>Helicopsyche borealis</i>	127	46	114	136	423	3%	105.8	40.8
<i>Glossosoma sp.</i>	0	0	2	1	3	0%	0.8	1.0
ANNELIDA						0%	4	
Naididae	0	0	1	5	6	0%	1.5	2.4
Tubificidae	0	1	0	2	3	0%	0.8	1.0
Glossiphoniidae	4	0	2	1	7	0%	1.8	1.7
CRUSTACEA								
<i>Hyalella azteca</i>	6	6	9	5	26	0%	6.5	1.7
<i>Caecidotea sp.</i>	4	4	20	7	35	0%	8.8	7.6
MOLLUSCA						1%	17	
<i>Physella sp.</i>	2	3	0	1	6	0%	1.5	1.3
<i>Gyraulus sp.</i>	7	21	30	2	60	0%	15.0	12.8
<i>Fossaria sp.</i>	1	1	0	0	2	0%	0.5	0.6
<i>Pisidium sp.</i>	0	1	0	0	1	0%	0.3	0.5
ID's by D. McGuire								

B.6 MACROINVERTEBRATE DATA								
MILL-WILLOW BYPASS - STATION MW-2 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	2171	2016	5123	3187	12497		3124	1430
TAXA RICHNESS	44	44	47	47	59		45.5	1.7
SHAN. DIVERSITY	3.20	3.39	3.68	3.41	3.64		3.42	0.20
BIOTIC INDEX	4.49	4.73	4.72	5.06	4.77		4.75	0.24
EPT RICHNESS	20	19	23	23	23		21.3	2.1
% R.A. DOMINANT	35%	24%	21%	35%	23%		29%	7.5%
% R.A. FILTERERS	10%	28%	28%	44%	29%		27%	14%
METALS TOLERANCE	4.35	4.54	4.62	4.87	4.63		4.60	0.21
Baetidae/Ephemeroptera	0.19	0.13	0.31	0.44	0.26		0.27	0.14
Hydropsychinae/Trichoptera	0.24	0.42	0.49	0.38	0.41		0.38	0.11
EPT / (EPT + CHIR.)	0.92	0.91	0.83	0.75	0.84		0.85	0.08
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	0	0	2	2	2		1.0	1.2
# SAND TOLERANT TAXA	7	7	6	6	8		6.5	0.6
# FINE SED TOLERANT TAXA	13	12	10	11	18		11.5	1.3
% SAND TOLERANT	44%	30%	27%	30%	31%		33%	8%
% FINE SED TOLERANT	32%	32%	23%	9%	22%		24%	11%
SEDIMENT TOLERANT INDEX	6.50	6.46	6.41	6.53	6.46		6.48	0.05
FSI	99	79	105	97	114		95.0	11.2

B.7 MACROINVERTEBRATE DATA								
WARM SPRINGS CREEK near mouth - STATION 06 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						24%	213	
<i>Optioservus spp.</i>	219	153	182	202	756	21%	189.0	28.4
<i>Zaitzevia sp.</i>	14	17	6	2	39	1%	9.8	6.9
<i>Cleptelmis ornata</i>	12	7	5	33	57	2%	14.3	12.8
DIPTERA						41%	371	
<i>Thienemannimyia gp.</i>	0	1	0	3	4	0%	1.0	1.4
<i>Nilotanyus sp.</i>	0	0	0	1	1	0%	0.3	0.5
<i>Pentaneura sp.</i>	1	0	0	1	2	0%	0.5	0.6
<i>Pagastia sp</i>	11	24	14	20	69	2%	17.3	5.9
<i>Cardiocladius spp.</i>	0	1	0	0	1	0%	0.3	0.5
<i>Corynoneura sp</i>	1	0	0	0	1	0%	0.3	0.5
<i>Cricotopus spp.</i>	7	7	1	3	18	0%	4.5	3.0
<i>Cricotopus nostococladius</i>	18	9	1	12	40	1%	10.0	7.1
<i>Eukiefferiella spp.</i>	18	18	14	18	68	2%	17.0	2.0
<i>Nanocladius sp.</i>	1	0	0	0	1	0%	0.3	0.5
<i>Orthocladius spp.</i>	50	16	7	17	90	2%	22.5	18.9
<i>Parametriochnemus sp.</i>	3	0	1	1	5	0%	1.3	1.3
<i>Tvetenia sp.</i>	8	9	14	34	65	2%	16.3	12.1
<i>Microtendipes sp</i>	1	0	0	0	1	0%	0.3	0.5
<i>Rheotanytarsus sp.</i>	116	174	180	286	756	21%	189.0	70.8
<i>Micropsectra spp.</i>	38	9	59	162	268	7%	67.0	66.6
<i>Antocha sp.</i>	8	9	2	6	25	1%	6.3	3.1
<i>Hexatoma sp.</i>	3	1	3	0	7	0%	1.8	1.5
<i>Tipula sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Simulium spp.</i>	1	0	7	37	45	1%	11.3	17.4
<i>Chelifera sp.</i>	1	2	3	6	12	0%	3.0	2.2
<i>Hemerodromia sp.</i>	1	1	1	0	3	0%	0.8	0.5
EPHEMEROPTERA						10%	94	
<i>Acentrella insignificans</i>	3	1	1	0	5	0%	1.3	1.3
<i>Baetis tricaudatus</i>	125	41	102	92	360	10%	90.0	35.5
<i>Baetis punctiventris</i>	0	1	1	0	2	0%	0.5	0.6
<i>Dipheter hageni</i>	0	0	1	1	2	0%	0.5	0.6
<i>Attenella margarita</i>	1	0	0	0	1	0%	0.3	0.5
<i>Nixe sp.</i>	2	0	1	0	3	0%	0.8	1.0
<i>Rhithrogena sp.</i>	1	0	0	0	1	0%	0.3	0.5
<i>Tricorythodes minutus</i>	0	1	0	2	3	0%	0.8	1.0
MEGALOPTERA								
<i>Sialis sp.</i>	0	0	1	0	1	0%	0.3	0.5

B.7 MACROINVERTEBRATE DATA								
WARM SPRINGS CREEK near mouth - STATION 06 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						3%	29	
<i>Hesperoperla pacifica</i>	5	2	7	5	19	1%	4.8	2.1
<i>Malenka sp.</i>	1	0	3	3	7	0%	1.8	1.5
<i>Skwala sp.</i>	8	8	5	3	24	1%	6.0	2.4
<i>Pteronarcella badia</i>	13	11	18	21	63	2%	15.8	4.6
<i>Chloroperlinae</i>	1	0	0	0	1	0%	0.3	0.5
TRICHOPTERA						22%	197	
<i>Arctopsyche grandis</i>	12	12	11	22	57	2%	14.3	5.2
<i>Cheumatopsyche spp.</i>	3	2	11	3	19	1%	4.8	4.2
<i>Hydropsyche occidentalis</i>	35	53	49	165	302	8%	75.5	60.2
<i>Hydropsyche (C) cockerelli</i>	6	3	4	6	19	1%	4.8	1.5
<i>Hydropsyche (C) nr. morosa</i>	0	0	1	0	1	0%	0.3	0.5
<i>Hydropsyche oslari ?</i>	0	0	0	1	1	0%	0.3	0.5
<i>Ochrotrichia sp.</i>	3	14	22	53	92	3%	23.0	21.5
<i>Lepidostoma sp.</i>	2	0	0	0	2	0%	0.5	1.0
<i>Trianodes sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Oecetis sp.</i>	0	0	1	2	3	0%	0.8	1.0
<i>Wormaldia sp.</i>	1	0	8	11	20	1%	5.0	5.4
<i>Brachycentrus americanus</i>	15	10	38	55	118	3%	29.5	20.9
<i>Brachycentrus occidentalis</i>	1	2	3	2	8	0%	2.0	0.8
<i>Micrasema sp.</i>	0	0	0	1	1	0%	0.3	0.5
<i>Rhyacophila brunnea gp.</i>	0	0	2	1	3	0%	0.8	1.0
<i>Helicopsyche borealis</i>	19	4	1	15	39	1%	9.8	8.6
<i>Agapetus sp.</i>	14	21	13	49	97	3%	24.3	16.9
<i>Protoptila sp.</i>	1	2	0	0	3	0%	0.8	1.0
<i>Glossosoma sp.</i>	2	1	0	0	3	0%	0.8	1.0
ANNELIDA						0%	1	
Naididae	0	0	0	1	1	0%	0.3	0.5
Tubificidae	0	0	0	1	1	0%	0.3	0.5
<i>Helobdella stagnalis</i>	1	0	0	0	1	0%	0.3	0.5
MOLLUSCA						0%	1	
<i>Physella sp.</i>	1	0	0	0	1	0%	0.3	0.5
<i>Pisidium sp.</i>	0	1	0	0	1	0%	0.3	0.5
ID's by D. McGuire								

B.7 MACROINVERTEBRATE DATA								
WARM SPRINGS CREEK near mouth - STATION 06 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	808	648	806	1359	3621		905	312
TAXA RICHNESS	46	36	42	41	63		41.3	4.1
SHAN. DIVERSITY	3.78	3.62	3.67	3.81	3.88		3.72	0.09
BIOTIC INDEX	4.61	4.71	4.49	4.47	4.55		4.57	0.11
EPT RICHNESS	23	18	23	21	32		21.3	2.4
% R.A. DOMINANT	27%	27%	23%	21%	21%		24%	3.0%
% R.A. FILTERERS	24%	40%	39%	43%	37%		36%	9%
METALS TOLERANCE	4.03	3.79	3.56	3.37	3.63		3.69	0.29
Baetidae/Ephemeroptera	0.97	0.98	0.99	0.98	0.98		0.98	0.01
Hydropsychinae/Trichoptera	0.39	0.47	0.39	0.45	0.43		0.43	0.04
EPT / (EPT + CHIR.)	0.50	0.41	0.51	0.48	0.48		0.48	0.04
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	7	6	4	3	7		5.0	1.8
# SAND TOLERANT TAXA	6	6	8	6	8		6.5	1.0
# FINE SED TOLERANT TAXA	9	4	7	6	14		6.5	2.1
% SEDIMENT TOLERANT	34%	29%	25%	19%	26%		27%	6%
% SEDIMENT TOLERANT	2%	1%	3%	2%	2%		2%	1%
SEDIMENT TOLERANT INDEX	6.08	5.99	5.91	5.84	5.94		5.96	0.10
FSBI	116	96	113	93	147		104.5	11.7

B.8 MACROINVERTEBRATE DATA								
CLARK FORK RIVER below Warm Springs Creek - STATION 07 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						23%	500	
<i>Optioservus spp.</i>	61	324	525	445	1355	16%	338.8	202.8
<i>Zaitzevia sp.</i>	2	55	75	123	255	3%	63.8	50.1
<i>Cleptelmis ornata</i>	30	36	231	93	390	5%	97.5	93.4
<i>Brychius sp.</i>	1	0	0	0	1	0%	0.3	0.5
DIPTERA						36%	779	
<i>Thienemannimyia gp.</i>	0	1	1	3	5	0%	1.3	1.3
<i>Nilotanyus sp.</i>	0	0	0	1	1	0%	0.3	0.5
<i>Pentaneura sp.</i>	0	3	1	2	6	0%	1.5	1.3
<i>Pagastia sp</i>	4	55	43	119	221	3%	55.3	47.8
<i>Brillia sp.</i>	2	0	0	0	2	0%	0.5	1.0
<i>Cardiocladius spp.</i>	0	1	5	0	6	0%	1.5	2.4
<i>Cricotopus spp.</i>	1	7	37	12	57	1%	14.3	15.8
<i>Cricotopus nostococladius</i>	0	2	1	3	6	0%	1.5	1.3
<i>Eukiefferiella spp.</i>	0	17	12	15	44	1%	11.0	7.6
<i>Orthocladius spp.</i>	2	24	8	24	58	1%	14.5	11.2
<i>Parametriocnemus sp.</i>	1	1	4	3	9	0%	2.3	1.5
<i>Thienemanniella sp.</i>	1	2	0	0	3	0%	0.8	1.0
<i>Tvtenia sp.</i>	6	42	11	23	82	1%	20.5	16.0
<i>Cryptochironomus sp.</i>	3	0	1	2	6	0%	1.5	1.3
<i>Microtendipes sp</i>	0	0	0	2	2	0%	0.5	1.0
<i>Stenochironmus sp.</i>	0	0	0	1	1	0%	0.3	0.5
<i>Polypedilum spp.</i>	1	8	2	3	14	0%	3.5	3.1
<i>Rheotanytarsus sp.</i>	11	62	72	145	290	3%	72.5	55.2
<i>Micropsectra spp.</i>	0	65	117	102	284	3%	71.0	52.1
<i>Antocha sp.</i>	11	45	16	35	107	1%	26.8	16.0
<i>Tipula sp.</i>	1	1	0	0	2	0%	0.5	0.6
<i>Simulium spp.</i>	69	750	478	611	1908	22%	477.0	293.8
<i>Hemerodromia sp.</i>	0	0	0	1	1	0%	0.3	0.5
EPHEMEROPTERA						13%	281	
<i>Baetis tricaudatus</i>	89	68	41	91	289	3%	72.3	23.3
<i>Baetis punctiventris</i>	1	1	0	1	3	0%	0.8	0.5
<i>Dipheter hageni</i>	1	15	1	2	19	0%	4.8	6.8
<i>Attenella margarita</i>	13	16	3	3	35	0%	8.8	6.8
<i>Drunella grandis</i>	0	0	1	0	1	0%	0.3	0.5
<i>Nixe sp.</i>	5	0	0	5	10	0%	2.5	2.9
<i>Paraleptophlebia sp.</i>	17	9	6	38	70	1%	17.5	14.4
<i>Tricorythodes minutus</i>	590	23	27	55	695	8%	173.8	277.9
LEPIDOPTERA								
<i>Petrophila sp.</i>	33	1	3	0	37	0%	9.3	15.9

B.8 MACROINVERTEBRATE DATA									
CLARK FORK RIVER below Warm Springs Creek - STATION 07 -7 AUG 2001									
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.	
MEGALOPTERA									
<i>Sialis sp.</i>	1	0	0	1	2	0%	0.5	0.6	
PLECOPTERA									
<i>Hesperoperla pacifica</i>	0	1	4	2	7	0%	1.8	1.7	
<i>Malenka sp.</i>	1	5	8	16	30	0%	7.5	6.4	
<i>Isogenoides sp.</i>	0	1	0	0	1	0%	0.3	0.5	
<i>Skwala sp.</i>	0	0	4	2	6	0%	1.5	1.9	
<i>Pteronarcella badia</i>	1	15	34	23	73	1%	18.3	13.9	
TRICHOPTERA									
<i>Cheumatopsyche spp.</i>	13	8	0	1	22	0%	5.5	6.1	
<i>Hydropsyche occidentalis</i>	2	158	162	126	448	5%	112.0	75.1	
<i>Hydropsyche (C) cockerelli</i>	1	24	25	31	81	1%	20.3	13.2	
<i>Hydropsyche (C) nr. morosa</i>	0	1	0	2	3	0%	0.8	1.0	
<i>Hydropsyche osleri ?</i>	0	0	2	2	4	0%	1.0	1.2	
<i>Hydroptila spp.</i>	170	266	65	373	874	10%	218.5	131.7	
<i>Ochrotrichia sp.</i>	1	39	5	10	55	1%	13.8	17.2	
<i>Lepidostoma sp.</i>	3	0	0	2	5	0%	1.3	1.5	
<i>Oecetis sp.</i>	12	17	0	20	49	1%	12.3	8.8	
<i>Wormaldia sp.</i>	0	4	0	1	5	0%	1.3	1.9	
<i>Psychomyia flavida</i>	3	0	0	0	3	0%	0.8	1.5	
<i>Brachycentrus occidentalis</i>	10	11	10	10	41	0%	10.3	0.5	
<i>Polycentropus sp.</i>	1	0	0	1	2	0%	0.5	0.6	
<i>Rhyacophila brunnea gp.</i>	9	53	74	13	149	2%	37.3	31.5	
<i>Helicopsyche borealis</i>	29	1	2	15	47	1%	11.8	13.1	
<i>Agapetus sp.</i>	0	0	0	1	1	0%	0.3	0.5	
ANNELIDA									
<i>Tubificidae</i>	17	13	6	12	48	1%	12.0	4.5	
<i>Erpobdellidae</i>	3	0	0	0	3	0%	0.8	1.5	
<i>Helobdella stagnalis</i>	18	0	3	1	22	0%	5.5	8.4	
CRUSTACEA									
<i>Hyalella azteca</i>	54	41	7	24	126	1%	31.5	20.4	
<i>Gammarus sp.</i>	3	12	0	3	18	0%	4.5	5.2	
<i>Caecidotea sp.</i>	10	2	0	5	17	0%	4.3	4.3	
MOLLUSCA									
<i>Physella sp.</i>	13	2	1	11	27	0%	6.8	6.1	
<i>Gyraulus sp.</i>	71	0	7	1	79	1%	19.8	34.3	
<i>Fossaria sp.</i>	1	0	0	0	1	0%	0.3	0.5	
<i>Pisidium sp.</i>	12	0	1	2	15	0%	3.8	5.6	

B.8 MACROINVERTEBRATE DATA								
CLARK FORK RIVER below Warm Springs Creek - STATION 07 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S.D.
OTHER								
Turbellaria	0	2	0	0	2	0%	0.5	1.0
ID's by D. McGuire								
TOTAL ORGANISMS	1415	2310	2142	2674	8541		2135	529
TAXA RICHNESS	5.0	4.8	4.4	5.7	6.9		49.8	5.4
SHAN. DIVERSITY	3.45	3.70	3.60	3.87	4.06		3.65	0.18
BIOTIC INDEX	4.98	5.21	4.86	5.01	5.02		5.01	0.14
EPT RICHNESS	21	21	18	26	29		21.5	3.3
% R.A. DOMINANT	42%	32%	25%	23%	22%		30%	8.6%
% R.A. FILTERERS	7%	44%	35%	35%	33%		30%	16%
METALS TOLERANCE	4.00	4.76	4.67	4.65	4.58		4.52	0.35
Baetidae/Ephemeroptera	0.13	0.64	0.53	0.48	0.28		0.44	0.22
Hydropsychinae/Trichoptera	0.06	0.33	0.55	0.27	0.31		0.30	0.20
EPT / (EPT + CHIR.)	0.97	0.72	0.60	0.65	0.73		0.73	0.16
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	0	1	1	2	2		1.0	0.8
# SAND TOLERANT TAXA	8	8	6	8	8		7.5	1.0
# FINE SED TOLERANT TAXA	18	8	9	15	19		12.5	4.8
% SAND TOLERANT	14%	23%	40%	28%	27%		26%	11%
% SEDIMENT TOLERANT	54%	3%	3%	6%	12%		16%	25%
SEDIMENT TOLERANT INDEX	6.38	6.32	6.57	6.35	6.40		6.40	0.11
FSBI	83	92	93	109	119		94.3	10.8

B.9 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Dempsey - STATION 8 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						13%	218	
<i>Optioservus spp.</i>	70	92	111	203	476	7%	119.0	58.5
<i>Zaitzevia sp.</i>	78	80	110	125	393	6%	98.3	23.1
<i>Cleptelmis ornata</i>	0	1	0	0	1	0%	0.3	0.5
<i>Agabus sp.</i>	0	0	0	2	2	0%	0.5	1.0
DIPTERA						25%	417	
<i>Thienemannimyia gp.</i>	2	2	6	7	17	0%	4.3	2.6
<i>Pentaneura sp.</i>	0	0	1	12	13	0%	3.3	5.9
<i>Pagastia sp</i>	0	11	26	50	87	1%	21.8	21.6
<i>Potthastia spp.</i>	1	0	0	0	1	0%	0.3	0.5
<i>Cardiocladius spp.</i>	0	0	0	1	1	0%	0.3	0.5
<i>Cricotopus spp.</i>	3	4	4	2	13	0%	3.3	1.0
<i>Eukiefferiella spp.</i>	1	3	1	1	6	0%	1.5	1.0
<i>Orthocladius spp.</i>	0	1	0	0	1	0%	0.3	0.5
<i>Parametriochnemus sp.</i>	4	5	6	50	65	1%	16.3	22.5
<i>Tvetenia sp.</i>	25	126	70	126	347	5%	86.8	48.9
<i>Microtendipes sp</i>	1	2	0	11	14	0%	3.5	5.1
<i>Phaenopsectra sp</i>	0	1	0	0	1	0%	0.3	0.5
<i>Polypedilum spp.</i>	4	2	9	20	35	1%	8.8	8.1
<i>Rheotanytarsus sp.</i>	0	2	0	2	4	0%	1.0	1.2
<i>Tanytarsus sp.</i>	2	2	0	1	5	0%	1.3	1.0
<i>Microsectra spp.</i>	0	1	0	2	3	0%	0.8	1.0
<i>Antocha sp.</i>	0	1	0	0	1	0%	0.3	0.5
<i>Hexatoma sp.</i>	2	8	5	4	19	0%	4.8	2.5
<i>Tipula sp.</i>	3	1	0	10	14	0%	3.5	4.5
<i>Ceratopogoninae</i>	0	0	1	0	1	0%	0.3	0.5
<i>Simulium spp.</i>	26	624	178	176	1004	15%	251.0	258.7
<i>Hemerodromia sp.</i>	0	12	2	0	14	0%	3.5	5.7
EPHEMEROPTERA						10%	167	
<i>Baetis tricaudatus</i>	12	43	45	138	238	4%	59.5	54.5
<i>Pladitus punctiventris</i>	0	0	1	56	57	1%	14.3	27.8
<i>Callibaetis sp.</i>	0	1	1	0	2	0%	0.5	0.6
<i>Attenella margarita</i>	1	1	17	15	34	1%	8.5	8.7
<i>Heptagenia sp.</i>	0	0	0	1	1	0%	0.3	0.5
<i>Paraleptophlebia sp.</i>	0	11	0	10	21	0%	5.3	6.1
<i>Tricorythodes minutus</i>	50	19	58	189	316	5%	79.0	75.2
LEPIDOPTERA								
<i>Petrophila sp.</i>	1	0	0	0	1	0%	0.3	0.5

B.9 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Dempsey - STATION 8 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
ODONATA								
<i>Ophiogomphus sp.</i>	0	0	1	0	1	0%	0.3	0.5
PLECOPTERA						2%	39	
<i>Isogenoides sp.</i>	3	5	1	2	11	0%	2.8	1.7
<i>Skwala sp.</i>	7	16	3	46	72	1%	18.0	19.4
<i>Isoperla sp.</i>	3	1	3	3	10	0%	2.5	1.0
<i>Pteronarcella badia</i>	7	5	22	27	61	1%	15.3	10.9
Chloroperlinae	0	1	1	0	2	0%	0.5	0.6
TRICHOPTERA						48%	806	
<i>Cheumatopsyche spp.</i>	11	5	56	238	310	5%	77.5	109.4
<i>Hydropsyche occidentalis</i>	81	347	335	1003	1766	26%	441.5	393.9
<i>Hydropsyche (C) cockerelli</i>	5	10	8	43	66	1%	16.5	17.8
<i>Hydropsyche (C) nr. morosa</i>	18	53	94	47	212	3%	53.0	31.3
<i>Hydropsyche slossonae</i>	0	1	0	0	1	0%	0.3	0.5
<i>Dicosmoecus sp.</i>	1	0	0	0	1	0%	0.3	0.5
<i>Hydroptila spp.</i>	80	169	157	161	567	9%	141.8	41.5
<i>Ochrotrichia sp.</i>	37	28	44	14	123	2%	30.8	12.9
<i>Nectopsyche sp.</i>	2	0	0	0	2	0%	0.5	1.0
<i>Oecetis sp.</i>	11	3	13	10	37	1%	9.3	4.3
<i>Brachycentrus occidentalis</i>	9	7	11	9	36	1%	9.0	1.6
<i>Helicopsyche borealis</i>	27	15	2	55	99	1%	24.8	22.6
<i>Glossosoma sp.</i>	2	1	2	0	5	0%	1.3	1.0
ANNELIDA						0%	7	
Naididae	3	11	1	10	25	0%	6.3	5.0
Tubificidae	1	0	0	0	1	0%	0.3	0.5
CRUSTACEA								
<i>Hyalella azteca</i>	2	1	2	0	5	0%	1.3	1.0
MOLLUSCA						1%	12	
<i>Physella sp.</i>	12	9	3	10	34	1%	8.5	3.9
<i>Gyraulus sp.</i>	1	0	0	0	1	0%	0.3	0.5
<i>Pisidium sp.</i>	10	1	1	0	12	0%	3.0	4.7
OTHER								
Turbellaria	2	0	0	0	2	0%	0.5	1.0
ID's by D. McGuire								

B.9 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Dempsey - STATION 8 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	621	1745	1412	2892	6670		1668	943
TAXA RICHNESS	41	46	39	40	60		41.5	3.1
SHAN. DIVERSITY	4.15	3.22	3.75	3.65	3.83		3.69	0.38
BIOTIC INDEX	4.86	5.28	4.92	4.80	4.96		4.97	0.22
EPT RICHNESS	19	21	20	19	25		19.8	1.0
% R.A. DOMINANT	13%	36%	24%	35%	26%		27%	11%
% R.A. FILTERERS	24%	60%	48%	52%	51%		46%	16%
METALS TOLERANCE	4.39	5.08	4.86	4.75	4.83		4.77	0.29
Baetidae/Ephemeroptera	0.19	0.59	0.39	0.47	0.44		0.41	0.17
Hydropsychinae/Trichoptera	0.41	0.65	0.68	0.84	0.73		0.65	0.18
EPT / (EPT + CHIR.)	0.90	0.82	0.88	0.88	0.87		0.87	0.03
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	1	1	1	0	1		0.8	0.5
# SAND TOLERANT TAXA	7	8	6	5	9		6.5	1.3
# FINE SED TOLERANT TAXA	9	9	8	8	16		8.5	0.6
% SAND TOLERANT	31%	12%	17%	14%	15%		18%	9%
% SEDIMENT TOLERANT	15%	3%	9%	16%	11%		11%	6%
SEDIMENT TOLERANT INDEX	5.86	6.11	5.79	5.90	5.93		5.92	0.13
FSBI	80	98	84	76	110		84.5	9.6

B.10 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Sager Lane - STATION 08.5 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						15%	299	
<i>Optioservus</i> spp.	274	69	193	97	633	8%	158.3	93.7
<i>Zaitzevia</i> sp.	241	78	128	99	546	7%	136.5	72.6
<i>Cleptelmis ornata</i>	16	1	0	1	18	0%	4.5	7.7
DIPTERA						17%	337	
<i>Thienemannimyia</i> gp.	53	4	29	8	94	1%	23.5	22.5
<i>Nilotanytus</i> sp.	1	0	0	1	2	0%	0.5	0.6
<i>Pentaneura</i> sp.	1	0	18	10	29	0%	7.3	8.5
<i>Pagastia</i> sp.	35	41	16	1	93	1%	23.3	18.3
<i>Cricotopus</i> spp.	16	16	9	41	82	1%	20.5	14.1
<i>Eukiefferiella</i> spp.	2	6	17	5	30	0%	7.5	6.6
<i>Orthocladus</i> spp.	0	1	2	0	3	0%	0.8	1.0
<i>Parametriochnemus</i> sp.	10	1	5	6	22	0%	5.5	3.7
<i>Tvetenia</i> sp.	153	94	156	105	508	6%	127.0	32.1
<i>Cryptochironomus</i> sp.	0	0	1	1	2	0%	0.5	0.6
<i>Microtendipes</i> sp.	40	1	32	2	75	1%	18.8	20.2
<i>Polypedium</i> spp.	32	18	45	21	116	1%	29.0	12.2
<i>Rheotanytarsus</i> sp.	0	0	0	1	1	0%	0.3	0.5
<i>Micropsectra</i> spp.	2	1	0	0	3	0%	0.8	1.0
<i>Antocha</i> sp.	4	6	14	12	36	0%	9.0	4.8
<i>Hexatoma</i> sp.	1	0	2	0	3	0%	0.8	1.0
<i>Tipula</i> sp.	0	0	1	0	1	0%	0.3	0.5
<i>Ceratopogoninae</i>	0	0	1	0	1	0%	0.3	0.5
<i>Simulium</i> spp.	43	48	10	145	246	3%	61.5	58.2
<i>Clinocera</i> sp.	1	0	0	1	2	0%	0.5	0.6
EPHEMEROPTERA						14%	274	
<i>Baetis tricaudatus</i>	331	24	212	24	591	7%	147.8	150.9
<i>Platidus punctiventris</i>	52	7	12	6	77	1%	19.3	22.0
<i>Dipheter hageni</i>	0	0	1	0	1	0%	0.3	0.5
<i>Attenella margarita</i>	16	4	23	3	46	1%	11.5	9.7
<i>Ephemerella inermis</i>	0	1	0	0	1	0%	0.3	0.5
<i>Heptagenia</i> sp.	1	0	0	0	1	0%	0.3	0.5
<i>Rhithrogena</i> sp.	0	0	1	0	1	0%	0.3	0.5
<i>Paraleptophlebia</i> sp.	19	0	11	1	31	0%	7.8	9.0
<i>Tricorythodes minutus</i>	86	90	111	59	346	4%	86.5	21.4
ODONATA								
<i>Ophiogomphus</i> sp.	0	0	2	1	3	0%	0.8	1.0



B.10 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Sager Lane - STATION 08.5 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	3089	1173	2436	1377	8075		2019	903
TAXA RICHNESS	40	31	44	39	55		38.5	5.4
SHAN. DIVERSITY	3.65	3.61	3.67	3.76	3.79		3.67	0.06
BIOTIC INDEX	4.71	4.68	4.81	4.99	4.78		4.80	0.14
EPT RICHNESS	18	16	22	18	25		18.5	2.5
% R.A. DOMINANT	28%	29%	30%	22%	27%		27%	3.7%
% R.A. FILTERERS	46%	47%	49%	54%	49%		49%	3%
METALS TOLERANCE	4.88	4.99	4.85	5.12	4.93		4.96	0.12
Baetidae/Ephemeroptera	0.76	0.25	0.61	0.32	0.61		0.48	0.24
Hydropsychinae/Trichoptera	0.85	0.78	0.88	0.86	0.85		0.85	0.04
EPT / (EPT + CHIR.)	0.86	0.81	0.84	0.80	0.84		0.83	0.03
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	0	0	1	1	2		0.5	0.6
# SAND TOLERANT TAXA	7	6	7	7	9		6.8	0.5
# FINE SED TOLERANT TAXA	7	3	11	6	13		6.8	3.3
% SAND TOLERANT	20%	18%	15%	16%	17%		17%	2%
% SEDIMENT TOLERANT	5%	9%	7%	7%	7%		7%	1%
SEDIMENT TOLERANT INDEX	5.58	5.68	5.58	5.81	5.64		5.66	0.11
FSBI	84	72	98	87	117		85.3	10.7

B.11 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Deer Lodge - STATION 09 -6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						9%	246	
<i>Optioservus</i> spp.	139	89	142	106	476	4%	119.0	25.8
<i>Zaitzevia</i> sp.	266	38	79	120	503	5%	125.8	99.3
<i>Cleptelmis ornata</i>	0	0	1	1	2	0%	0.5	0.6
<i>Oreodytes</i> spp.	1	0	0	0	1	0%	0.3	0.5
DIPTERA						26%	703	
<i>Thienemannimyia</i> gp.	17	6	4	8	35	0%	8.8	5.7
<i>Nilotanyus</i> sp.	1	0	0	0	1	0%	0.3	0.5
<i>Pentaneura</i> sp.	7	0	0	43	50	0%	12.5	20.6
<i>Pagastia</i> sp	47	40	43	35	165	2%	41.3	5.1
<i>Brillia</i> sp.	0	0	1	0	1	0%	0.3	0.5
<i>Cardiocladius</i> spp.	1	0	15	0	16	0%	4.0	7.3
<i>Cricotopus</i> spp.	53	80	73	128	334	3%	83.5	31.8
<i>Eukiefferiella</i> spp.	1	13	14	1	29	0%	7.3	7.2
<i>Orthocladius</i> spp.	0	4	0	0	4	0%	1.0	2.0
<i>Parametriochnemus</i> sp.	11	0	0	1	12	0%	3.0	5.4
<i>Tvetenia</i> sp.	114	204	112	130	560	5%	140.0	43.4
<i>Cryptochironomus</i> sp.	0	0	0	1	1	0%	0.3	0.5
<i>Microtendipes</i> sp	8	1	5	163	177	2%	44.3	79.2
<i>Polypedilum</i> spp.	20	13	8	54	95	1%	23.8	20.8
<i>Tanytarsus</i> sp.	0	1	0	0	1	0%	0.3	0.5
<i>Antocha</i> sp.	12	114	110	6	242	2%	60.5	59.5
<i>Hexatoma</i> sp.	1	7	0	4	12	0%	3.0	3.2
<i>Tipula</i> sp.	1	2	0	0	3	0%	0.8	1.0
<i>Atherix pachypus</i>	8	5	0	1	14	0%	3.5	3.7
<i>Simulium</i> spp.	358	227	197	257	1039	10%	259.8	69.9
<i>Chelifera</i> sp.	0	0	0	1	1	0%	0.3	0.5
<i>Hemerodromia</i> sp.	2	13	3	1	19	0%	4.8	5.6
EPHEMEROPTERA						8%	208	
<i>Acentrella insignificans</i>	0	0	1	0	1	0%	0.3	0.5
<i>Baetis tricaudatus</i>	54	5	32	59	150	1%	37.5	24.6
<i>Pladitus punctiventris</i>	5	1	6	42	54	0%	13.5	19.1
<i>Attenella margarita</i>	10	11	23	43	87	1%	21.8	15.3
<i>Ephemerella inermis</i>	3	0	0	0	3	0%	0.8	1.5
<i>Paraleptophlebia bicornuta</i>	0	0	0	1	1	0%	0.3	0.5
<i>Paraleptophlebia</i> sp.	0	0	0	2	2	0%	0.5	1.0
<i>Tricorythodes minutus</i>	101	47	34	352	534	5%	133.5	148.5
LEPIDOPTERA								
<i>Petrophila</i> sp.	3	2	2	1	8	0%	2.0	0.8

B.11 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Deer Lodge - STATION 09 -6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						0%	4	
<i>Claassenia sabulosa</i>	0	0	0	1	1	0%	0.3	0.5
<i>Isogenoides sp.</i>	1	0	2	0	3	0%	0.8	1.0
<i>Pteronarcella badia</i>	3	0	2	5	10	0%	2.5	2.1
<i>Pteronarcys californica</i>	0	0	0	1	1	0%	0.3	0.5
TRICHOPTERA						55%	1501	
<i>Cheumatopsyche spp.</i>	32	1	6	1	40	0%	10.0	14.9
<i>Hydropsyche occidentalis</i>	689	417	269	1169	2544	23%	636.0	395.6
<i>Hydropsyche (C) cockerelli</i>	12	24	5	23	64	1%	16.0	9.1
<i>Hydropsyche (C) nr. morosa</i>	445	292	381	374	1492	14%	373.0	62.7
<i>Dicosmoecus sp.</i>	0	1	0	0	1	0%	0.3	0.5
<i>Hydroptila spp.</i>	57	126	97	166	446	4%	111.5	46.0
<i>Ochrotrichia sp.</i>	29	111	90	48	278	3%	69.5	37.6
<i>Oecetis sp.</i>	0	6	1	1	8	0%	2.0	2.7
<i>Brachycentrus occidentalis</i>	37	8	3	8	56	1%	14.0	15.5
<i>Helicopsyche borealis</i>	10	102	397	566	1075	10%	268.8	257.9
ANNELIDA						1%	39	
Tubificidae	2	4	32	116	154	1%	38.5	53.5
MOLLUSCA						0%	8	
<i>Physella sp.</i>	1	0	0	3	4	0%	1.0	1.4
<i>Ferrissia sp.</i>	10	1	2	0	13	0%	3.3	4.6
<i>Gyraulus sp.</i>	0	0	0	0	0	0%	0.0	0.0
<i>Pisidium sp.</i>	0	0	1	13	14	0%	3.5	6.4
OTHER								
Turbellaria	11	0	18	31	60	1%	15.0	13.0
ID's by D. McGuire								

B.11 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Deer Lodge - STATION 09 -6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	2583	2016	2211	4087	10897		2724	938
TAXA RICHNESS	40	34	36	42	55		38.0	3.7
SHAN. DIVERSITY	3.50	3.72	3.79	3.66	3.87		3.67	0.13
BIOTIC INDEX	4.89	4.86	4.62	4.89	4.83		4.82	0.13
EPT RICHNESS	15	14	16	18	22		15.8	1.7
% R.A. DOMINANT	27%	21%	18%	29%	23%		23%	5.0%
% R.A. FILTERERS	61%	48%	39%	45%	48%		48%	9%
METALS TOLERANCE	5.24	5.07	5.08	4.87	5.04		5.06	0.15
Baetidae/Ephemeroptera	0.34	0.09	0.41	0.20	0.25		0.26	0.14
Hydropsychinae/Trichoptera	0.90	0.68	0.53	0.67	0.69		0.69	0.15
EPT / (EPT + CHIR.)	0.84	0.76	0.83	0.84	0.82		0.82	0.04
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	0	0	1	1	2		0.5	0.6
# SAND TOLERANT TAXA	5	6	6	7	7		6.0	0.8
# FINE SED TOLERANT TAXA	6	4	4	9	11		5.8	2.4
% SAND TOLERANT	17%	18%	33%	20%	21%		22%	8%
% SEDIMENT TOLERANT	5%	3%	3%	12%	7%		6%	4%
SEDIMENT TOLERANT INDEX	5.64	5.71	5.90	5.94	5.82		5.80	0.15
FSBI	86	88	78	96	115		87.0	7.4

B.12 MACROINVERTEBRATE DATA								
CLARK FORK RIVER above Little Blackfoot River - STATION 10-7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						8%	167	
<i>Optioservus spp.</i>	54	24	50	81	209	3%	52.3	23.3
<i>Zaitzevia sp.</i>	133	133	117	74	457	6%	114.3	27.9
<i>Deronectes sp.</i>	0	0	0	1	1	0%	0.3	0.5
DIPTERA						23%	477	
<i>Thienemannimyia gp.</i>	24	0	22	9	55	1%	13.8	11.3
<i>Pentaneura sp.</i>	26	0	5	16	47	1%	11.8	11.6
<i>Cardiocladius spp.</i>	0	1	0	1	2	0%	0.5	0.6
<i>Cricotopus spp.</i>	5	0	1	6	12	0%	3.0	2.9
<i>Eukiefferiella spp.</i>	10	3	11	0	24	0%	6.0	5.4
<i>Orthocladius spp.</i>	1	0	0	1	2	0%	0.5	0.6
<i>Parametriochnemus sp.</i>	80	0	24	2	106	1%	26.5	37.3
<i>Tvetenia sp.</i>	305	151	261	138	855	10%	213.8	82.1
<i>Cryptochironomus sp.</i>	0	0	1	2	3	0%	0.8	1.0
<i>Microtendipes sp</i>	26	6	4	8	44	1%	11.0	10.1
<i>Polypedium spp.</i>	36	10	1	7	54	1%	13.5	15.5
<i>Rheotanytarsus sp.</i>	1	0	0	0	1	0%	0.3	0.5
<i>Tanytarsus sp.</i>	1	0	0	0	1	0%	0.3	0.5
<i>Micropsectra spp.</i>	1	1	0	0	2	0%	0.5	0.6
<i>Antocha sp.</i>	0	3	6	1	10	0%	2.5	2.6
<i>Hexatoma sp.</i>	4	6	2	2	14	0%	3.5	1.9
<i>Simulium spp.</i>	184	145	254	90	673	8%	168.3	69.0
<i>Hemerodromia sp.</i>	0	0	0	1	1	0%	0.3	0.5
EPHEMEROPTERA						18%	372	
<i>Acentrella insignificans</i>	0	2	0	1	3	0%	0.8	1.0
<i>Baetis tricaudatus</i>	6	22	57	63	148	2%	37.0	27.5
<i>Pladitus punctiventris</i>	15	18	52	162	247	3%	61.8	68.9
<i>Attenella margarita</i>	24	7	15	45	91	1%	22.8	16.4
<i>Serratella tibialis</i>	0	1	0	1	2	0%	0.5	0.6
<i>Ephemerella inermis</i>	0	0	0	1	1	0%	0.3	0.5
<i>Heptagenia sp.</i>	0	1	2	4	7	0%	1.8	1.7
<i>Nixe sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Tricorythodes minutus</i>	100	23	199	664	986	12%	246.5	287.5
LEPIDOPTERA								
<i>Petrophila sp.</i>	0	0	0	1	1	0%	0.3	0.5
PLECOPTERA						0%	8	
<i>Isogenoides sp.</i>	3	4	1	15	23	0%	5.8	6.3
<i>Skwala sp.</i>	0	1	1	6	8	0%	2.0	2.7
<i>Isoperla sp.</i>	1	0	1	0	2	0%	0.5	0.6

B.12 MACROINVERTEBRATE DATA								
CLARK FORK RIVER above Little Blackfoot River - STATION 10 -7 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TRICHOPTERA						49%	1026	
<i>Cheumatopsyche</i> spp.	102	66	69	109	346	4%	86.5	22.2
<i>Hydropsyche occidentalis</i>	655	576	552	755	2538	31%	634.5	91.6
<i>Hydropsyche</i> (C) <i>cockerelli</i>	114	105	33	11	263	3%	65.8	51.4
<i>Hydropsyche</i> (C) <i>nr. morosa</i>	187	138	95	119	539	6%	134.8	39.0
<i>Dicosmoecus</i> sp.	0	0	0	2	2	0%	0.5	1.0
<i>Hydroptila</i> spp.	30	19	97	77	223	3%	55.8	37.3
<i>Ochrotrichia</i> sp.	50	27	40	39	156	2%	39.0	9.4
<i>Lepidostoma</i> sp.	1	0	0	0	1	0%	0.3	0.5
<i>Oecetis</i> sp.	1	0	0	0	1	0%	0.3	0.5
<i>Brachycentrus occidentalis</i>	5	8	7	7	27	0%	6.8	1.3
<i>Helicopsyche borealis</i>	1	0	0	2	3	0%	0.8	1.0
<i>Protophila</i> sp.	0	1	1	1	3	0%	0.8	0.5
ANNELIDA						1%	26	
Naididae	0	0	0	1	1	0%	0.3	0.5
Tubificidae	11	22	55	15	103	1%	25.8	20.0
MOLLUSCA						0%	2	
<i>Physella</i> sp.	0	1	1	3	5	0%	1.3	1.3
<i>Fossaria</i> sp.	0	0	0	2	2	0%	0.5	1.0
<i>Pisidium</i> sp.	0	0	0	1	1	0%	0.3	0.5
OTHER								
Turbellaria	0	0	1	0	1	0%	0.3	0.5
ID's by D. McGuire								
TOTAL ORGANISMS	2197	1525	2039	2547	8308		2077	425
TAXA RICHNESS	33	30	34	43	52		35.0	5.6
SHAN. DIVERSITY	3.55	3.19	3.57	3.30	3.59		3.40	0.19
BIOTIC INDEX	4.97	4.95	5.10	4.78	4.94		4.95	0.13
EPT RICHNESS	16	17	17	20	24		17.5	1.7
% R.A. DOMINANT	30%	38%	27%	30%	31%		31%	4.6%
% R.A. FILTERERS	57%	68%	50%	43%	53%		54%	11%
METALS TOLERANCE	4.72	4.89	4.75	4.46	4.68		4.70	0.18
Baetidae/Ephemeroptera	0.14	0.57	0.33	0.24	0.27		0.32	0.18
Hydropsychinae/Trichoptera	0.92	0.94	0.84	0.89	0.90		0.90	0.05
EPT / (EPT + CHIR.)	0.72	0.86	0.79	0.92	0.82		0.82	0.09
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	0	2	1	2	2		1.3	1.0
# SAND TOLERANT TAXA	5	4	4	5	6		4.5	0.6
# FINE SED TOLERANT TAXA	5	5	8	9	12		6.8	2.1
% SAND TOLERANT	9%	11%	9%	6%	8%		9%	2%
% SEDIMENT TOLERANT	10%	7%	16%	31%	18%		16%	11%
SEDIMENT TOLERANT INDEX	5.91	5.66	5.96	5.75	5.83		5.82	0.14
FSBI	66	86	79	101	107		83.0	14.6

B.13 MACROINVERTEBRATE DATA								
LITTLE BLACKFOOT RIVER near mouth - STATION 10.2 -4 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						4%	45	
<i>Optioservus spp.</i>	19	10	19	68	116	2%	29.0	26.3
<i>Zaitzevia sp.</i>	11	2	7	44	64	1%	16.0	19.0
<i>Lara sp.</i>	0	0	0	1	1	0%	0.3	0.5
DIPTERA						73%	902	
<i>Thienemannimyia gp.</i>	1	0	3	3	7	0%	1.8	1.5
<i>Pentaneura sp.</i>	0	2	0	1	3	0%	0.8	1.0
<i>Pagastia sp</i>	15	21	34	38	108	2%	27.0	10.8
<i>Potthastia spp.</i>	0	1	0	1	2	0%	0.5	0.6
<i>Cardiocladius spp.</i>	3	25	16	5	49	1%	12.3	10.2
<i>Corynoneura sp</i>	0	1	0	2	3	0%	0.8	1.0
<i>Cricotopus spp.</i>	19	14	0	1	34	1%	8.5	9.5
<i>Cricotopus nostococladius</i>	51	87	73	24	235	5%	58.8	27.5
<i>Eukiefferiella spp.</i>	13	76	10	41	140	3%	35.0	30.7
<i>Orthocladus spp.</i>	27	28	21	3	79	2%	19.8	11.6
<i>Parametriochnemus sp.</i>	0	1	6	0	7	0%	1.8	2.9
<i>Tvetenia sp.</i>	138	173	82	94	487	10%	121.8	41.8
<i>Microtendipes sp</i>	0	1	0	0	1	0%	0.3	0.5
<i>Polypedilum spp.</i>	98	37	115	31	281	6%	70.3	42.5
<i>Rheotanytarsus sp.</i>	1	4	2	2	9	0%	2.3	1.3
<i>Subletia sp.</i>	0	1	0	0	1	0%	0.3	0.5
<i>Micropsectra spp.</i>	397	94	417	244	1152	23%	288.0	150.7
<i>Antocha sp.</i>	5	15	12	16	48	1%	12.0	5.0
<i>Hexatoma sp.</i>	8	5	17	8	38	1%	9.5	5.2
<i>Limnophila sp.</i>	3	0	1	0	4	0%	1.0	1.4
<i>Simulium (Eusimulium)</i>	87	227	258	340	912	18%	228.0	105.4
<i>Clinocera sp.</i>	0	1	5	1	7	0%	1.8	2.2
EPHEMEROPTERA						13%	163	
<i>Acentrella sp.</i>	0	1	4	7	12	0%	3.0	3.2
<i>Baetis tricaudatus</i>	13	24	39	45	121	2%	30.3	14.5
<i>Attenella margarita</i>	19	11	41	41	112	2%	28.0	15.4
<i>Serratella tibialis</i>	17	12	18	22	69	1%	17.3	4.1
<i>Timpano hecuba</i>	0	0	1	0	1	0%	0.3	0.5
<i>Epeorus albertae</i>	2	1	1	0	4	0%	1.0	0.8
<i>Nixe sp.</i>	16	7	16	18	57	1%	14.3	4.9
<i>Paraleptophlebia sp.</i>	1	0	0	1	2	0%	0.5	0.6
<i>Tricorythodes minutus</i>	12	4	38	218	272	6%	68.0	101.0



B.13 MACROINVERTEBRATE DATA								
LITTLE BLACKFOOT RIVER near mouth - STATION 10.2 -4 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	1078	1042	1385	1429	4934		1234	202
TAXA RICHNESS	37	43	38	50	57		42.0	5.9
SHAN. DIVERSITY	3.48	3.93	3.63	3.80	3.94		3.71	0.20
BIOTIC INDEX	4.50	5.08	4.53	4.57	4.65		4.67	0.28
EPT RICHNESS	18	20	19	25	28		20.5	3.1
% R.A. DOMINANT	37%	22%	30%	24%	23%		28%	6.8%
% R.A. FILTERERS	16%	33%	27%	27%	26%		26%	7%
METALS TOLERANCE	3.07	4.69	3.49	4.12	3.84		3.84	0.71
Baetidae/Ephemeroptera	0.16	0.42	0.27	0.15	0.20		0.25	0.12
Hydropsychinae/Trichoptera	0.22	0.42	0.26	0.18	0.28		0.27	0.10
EPT / (EPT + CHIR.)	0.19	0.26	0.27	0.48	0.30		0.30	0.13
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	4	5	5	5	7		4.8	0.5
# SAND TOLERANT TAXA	5	4	5	6	7		5.0	0.8
# FINE SED TOLERANT TAXA	5	4	2	8	8		4.8	2.5
% SAND TOLERANT	4%	3%	4%	10%	6%		5%	3%
% SEDIMENT TOLERANT	3%	1%	4%	17%	7%		6%	7%
SEDIMENT TOLERANT INDEX	6.07	6.23	6.05	6.22	6.14		6.14	0.10
FSBI	105	123	117	129	143		118.5	10.2

B.14 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Gold Creek Bridge - STATION 11 -6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						7%	82	
<i>Optioservus spp.</i>	80	17	17	29	143	3%	35.8	30.0
<i>Zaitzevia sp.</i>	97	37	33	17	184	4%	46.0	35.1
<i>Cleptelmis ornata</i>	1	0	0	0	1	0%	0.3	0.5
<i>Agabus sp.</i>	0	1	0	0	1	0%	0.3	0.5
DIPTERA						14%	180	
<i>Thienemannimyia gp.</i>	3	24	1	3	31	1%	7.8	10.9
<i>Pentaneura sp.</i>	2	4	0	6	12	0%	3.0	2.6
<i>Pagastia sp</i>	1	2	2	2	7	0%	1.8	0.5
<i>Monodiamesa sp.</i>	0	1	0	0	1	0%	0.3	0.5
<i>Cardiocladius spp.</i>	0	1	0	0	1	0%	0.3	0.5
<i>Corynoneura sp</i>	0	1	0	0	1	0%	0.3	0.5
<i>Cricotopus spp.</i>	9	29	2	3	43	1%	10.8	12.6
<i>Eukiefferiella spp.</i>	30	37	6	4	77	2%	19.3	16.7
<i>Orthocladius spp.</i>	55	46	5	6	112	2%	28.0	26.2
<i>Parametriochnemus sp.</i>	1	18	2	2	2	0%	5.8	8.2
<i>Tvetenia sp.</i>	27	36	8	2	73	1%	18.3	15.9
<i>Cryptochironomus sp.</i>	1	2	0	0	3	0%	0.8	1.0
<i>Microtendipes sp</i>	0	2	0	1	3	0%	0.8	1.0
<i>Paracladopelma sp.</i>	1	0	0	0	1	0%	0.3	0.5
<i>Polypedilum spp.</i>	12	12	1	4	29	1%	7.3	5.6
<i>Microspectra spp.</i>	14	2	11	3	30	1%	7.5	5.9
<i>Antocha sp.</i>	12	13	4	4	33	1%	8.3	4.9
<i>Hexatoma sp.</i>	7	2	13	1	23	0%	5.8	5.5
<i>Tipula sp.</i>	1	0	0	0	1	0%	0.3	0.5
<i>Atherix pachypus</i>	21	36	4	8	69	1%	17.3	14.5
<i>Simulium spp.</i>	48	51	10	19	128	3%	32.0	20.6
<i>Hemerodromia sp.</i>	1	13	2	2	18	0%	4.5	5.7
EPHEMEROPTERA						51%	647	
<i>Centroptilium sp.</i>	0	1	0	0	1	0%	0.3	0.5
<i>Baetis tricaudatus</i>	19	34	19	24	96	2%	24.0	7.1
<i>Pladitus punctiventris</i>	2	41	0	5	48	1%	12.0	19.4
<i>Dipheter hageni</i>	0	1	0	0	1	0%	0.3	0.5
<i>Attenella margarita</i>	8	37	7	12	64	1%	16.0	14.2
<i>Serratella tibialis</i>	2	1	0	1	4	0%	1.0	0.8
<i>Ephemerella inermis</i>	1	0	0	0	1	0%	0.3	0.5
<i>Drunella grandis</i>	2	0	0	1	3	0%	0.8	1.0
<i>Heptagenia sp.</i>	0	1	6	3	10	0%	2.5	2.6
<i>Nixe sp.</i>	0	0	3	0	3	0%	0.8	1.5
<i>Rhithrogena sp.</i>	1	0	1	0	2	0%	0.5	0.6
<i>Paraleptophlebia sp.</i>	0	3	1	0	4	0%	1.0	1.4
<i>Tricorythodes minutus</i>	306	1673	74	298	2351	47%	587.8	731.4

APPENDIX D. Clark Fork River Basin aquatic and riparian habitat data.

Habitat Assessment- MDEQ RBP Field Sheet																								
August, 4-8 2001 - Investigator: D. McGuire																								
metric	station	SF-1	0	1	2.5	4.5	5	6	7	8	8.5	9	10	10.2	11	11.5	11.7	12	12.5	13	14	15.5	18	19
Riffle Development			5	5	7	9		6	7	6	7	9	6	9	7	7	8	6	9	9	10	10	6	7
Benthic Substrate		5	6	5	6	7		6	6	5	6	8	5	9	4	8	6	7	9	9	9	10	9	9
Embeddedness		10	13	11	16	13		14	9	9	8	10	7	15	8	14	10	12	19	14	17	17	19	16
Channel Alteration		3	19	10	16	18		12	18	16	13	13	16	16	15	19	17	17	17	15	18	18	19	16
Sediment Deposition		7	10	6	13	14		14	14	10	12	12	10	17	11	12	13	14	16	15	17	14	15	18
Flow Status		16	18	16	16	16		17	15	11	12	16	16	16	16	17	17	17	17	16	14	11	14	16
Bank Stability		19	19	8	12	19		19	19	18	15	16	14	18	16	16	14	12	14	16	17	16	12	15
Bank Vegetation		19	16	3	8	18		14	20	18	13	15	14	18	14	13	17	12	15	14	13	14	17	16
Riparian Width		15	18	4	5	19		12	19	19	18	17	18	16	15	17	15	14	15	14	16	20	18	15
Total Score		94	124	68	99	133		114	127	112	104	116	106	134	106	123	117	111	131	122	131	130	129	128
% of max possible		59%	78%	43%	62%	83%		71%	79%	70%	65%	73%	66%	84%	66%	77%	73%	69%	82%	76%	82%	81%	81%	80%

B.14 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Gold Creek Bridge - STATION 11 -6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						1%	14	
<i>Claassenia sabulosa</i>	0	1	0	1	2	0%	0.5	0.6
<i>Hesperoperla pacifica</i>	2	1	0	0	3	0%	0.8	1.0
<i>Isogenoides sp.</i>	8	5	8	20	41	1%	10.3	6.7
<i>Skwala sp.</i>	0	5	3	2	10	0%	2.5	2.1
TRICHOPTERA						23%	291	
<i>Arctopsyche grandis</i>	7	11	1	2	21	0%	5.3	4.6
<i>Cheumatopsyche spp.</i>	3	5	0	2	10	0%	2.5	2.1
<i>Hydropsyche occidentalis</i>	113	173	9	19	314	6%	78.5	78.5
<i>Hydropsyche (C) cockerelli</i>	244	161	30	23	458	9%	114.5	107.2
<i>Hydropsyche (C) nr. morosa</i>	1	0	0	5	6	0%	1.5	2.4
<i>Dicosmoecus sp.</i>	0	1	1	1	3	0%	0.8	0.5
<i>Hydroptila spp.</i>	61	10	13	49	133	3%	33.3	25.6
<i>Ochrotrichia sp.</i>	89	48	12	23	172	3%	43.0	34.2
<i>Lepidostoma sp.</i>	0	1	0	0	1	0%	0.3	0.5
<i>Oecetis sp.</i>	12	0	4	3	19	0%	4.8	5.1
<i>Brachycentrus occidentalis</i>	2	4	3	7	16	0%	4.0	2.2
<i>Helicopsyche borealis</i>	0	1	5	3	9	0%	2.3	2.2
<i>Protophila sp.</i>	1	0	0	0	1	0%	0.3	0.5
<i>Glossosoma sp.</i>	0	0	1	0	1	0%	0.3	0.5
ANNELIDA						4%	48	
Naididae	1	0	0	0	1	0%	0.3	0.5
Tubificidae	19	156	6	11	192	4%	48.0	72.2
MOLLUSCA						0%	1	
<i>Physella sp.</i>	0	1	2	1	4	0%	1.0	0.8
<i>Pisidium sp.</i>	0	0	1	0	1	0%	0.3	0.5
OTHER								
Turbellaria	1	5	2	4	12	0%	3.0	1.8
ID's by D. McGuire								

B.14 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Gold Creek Bridge - STATION 11 -6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	1329	2768	333	636	5045		1267	1084
TAXA RICHNESS	44	49	39	42	62		43.5	4.2
SHAN. DIVERSITY	3.79	2.64	4.33	3.41	3.35		3.54	0.71
BIOTIC INDEX	4.59	4.59	4.32	4.41	4.55		4.48	0.14
EPT RICHNESS	20	23	19	21	31		20.8	1.7
% R.A. DOMINANT	23%	60%	22%	47%	47%		38%	19%
% R.A. FILTERERS	31%	15%	16%	12%	19%		19%	9%
METALS TOLERANCE	4.32	4.28	4.02	4.09	4.25		4.18	0.15
Baetidae/Ephemeroptera	0.06	0.04	0.17	0.08	0.06		0.09	0.06
Hydropsychinae/Trichoptera	0.68	0.82	0.51	0.36	0.68		0.59	0.20
EPT / (EPT + CHIR.)	0.85	0.91	0.84	0.93	0.90		0.88	0.05
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	3	2	3	1	5		2.3	1.0
# SAND TOLERANT TAXA	6	5	6	6	7		5.8	0.5
# FINE SED TOLERANT TAXA	6	10	7	5	14		7.0	2.2
% SAND TOLERANT	16%	3%	23%	9%	8%		13%	9%
% SEDIMENT TOLERANT	25%	67%	28%	50%	51%		42%	20%
SEDIMENT TOLERANT INDEX	5.68	6.07	5.85	5.80	5.91		5.85	0.16
FSBI	121	115	105	112	150		113.3	6.7

B.15 MACROINVERTEBRATE DATA									
FLINT CREEK near New Chicago - STATION 11.5 -6 AUG 2001									
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.	
COLEOPTERA						6%	63		
<i>Optioservus</i> spp.	101	22	74	23	220	5%	55.0	39.1	
<i>Zaitzevia</i> sp.	1	7	9	15	32	1%	8.0	5.8	
DIPTERA						36%	391		
<i>Thienemannimyia</i> gp.	0	1	1	0	2	0%	0.5	0.6	
<i>Pagastia</i> sp	13	7	33	5	58	1%	14.5	12.8	
<i>Cardiocladius</i> spp.	10	21	7	10	48	1%	12.0	6.2	
<i>Cricotopus</i> spp.	35	3	20	8	66	1%	16.5	14.2	
<i>Cricotopus nostoccladius</i>	1	0	0	0	1	0%	0.3	0.5	
<i>Eukiefferiella</i> spp.	25	14	20	13	72	2%	18.0	5.6	
<i>Orthocladus</i> spp.	46	12	73	30	161	4%	40.3	25.9	
<i>Parametricnemus</i> sp.	2	2	1	3	8	0%	2.0	0.8	
<i>Rheocricotopus</i> sp.	0	0	0	1	1	0%	0.3	0.5	
<i>Cryptochironomus</i> sp.	0	0	4	0	4	0%	1.0	2.0	
<i>Microtendipes</i> sp	3	0	52	0	55	1%	13.8	25.5	
<i>Polypedium</i> spp.	2	1	3	0	6	0%	1.5	1.3	
<i>Rheotanytarsus</i> sp.	2	1	6	1	10	0%	2.5	2.4	
<i>Tanytarsus</i> sp.	0	0	1	0	1	0%	0.3	0.5	
<i>Micropectra</i> spp.	2	1	3	2	8	0%	2.0	0.8	
<i>Antocha</i> sp.	7	1	3	15	26	1%	6.5	6.2	
<i>Hexatoma</i> sp.	3	0	1	5	9	0%	2.3	2.2	
<i>Simulium</i> spp.	682	76	63	208	1029	23%	257.3	290.6	
EPHEMEROPTERA						12%	136		
<i>Baetis tricaudatus</i>	94	32	156	73	355	8%	88.8	51.7	
<i>Pladitus punctiventris</i>	1	0	0	0	1	0%	0.3	0.5	
<i>Dipheter hageni</i>	0	0	2	0	2	0%	0.5	1.0	
<i>Attenella margarita</i>	3	3	3	12	21	0%	5.3	4.5	
<i>Ephemerella inermis</i>	0	1	0	0	1	0%	0.3	0.5	
<i>Heptagenia</i> sp.	1	1	7	1	10	0%	2.5	3.0	
<i>Nixe</i> sp.	0	0	1	4	5	0%	1.3	1.9	
<i>Paraleptophlebia</i> sp.	0	0	10	0	10	0%	2.5	5.0	
<i>Tricorythodes minutus</i>	14	16	92	15	137	3%	34.3	38.5	
PLECOPTERA						1%	16		
<i>Claassenia sabulosa</i>	0	0	0	4	4	0%	1.0	2.0	
<i>Hesperoperla pacifica</i>	0	1	0	1	2	0%	0.5	0.6	
<i>Malenka</i> sp.	0	0	1	0	1	0%	0.3	0.5	
<i>Isogenoides</i> sp.	2	0	0	0	2	0%	0.5	1.0	
<i>Skwala</i> sp.	9	1	8	18	36	1%	9.0	7.0	
<i>Pteronarcella badia</i>	4	0	1	0	5	0%	1.3	1.9	
<i>Pteronarcys californica</i>	1	7	3	1	12	0%	3.0	2.8	

B.15 MACROINVERTEBRATE DATA								
FLINT CREEK near New Chicago - STATION 11.5 -6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TRICHOPTERA						42%	459	
<i>Arctopsyche grandis</i>	1	2	1	1	5	0%	1.3	0.5
<i>Cheumatopsyche</i> spp.	1	1	7	0	9	0%	2.3	3.2
<i>Hydropsyche occidentalis</i>	68	16	332	33	449	10%	112.3	148.1
<i>Hydropsyche (C) cockerelli</i>	60	20	41	43	164	4%	41.0	16.4
<i>Hydropsyche (C) nr. morosa</i>	0	6	8	8	22	0%	5.5	3.8
<i>Hydroptila</i> spp.	0	6	5	0	11	0%	2.8	3.2
<i>Ochrotrichia</i> sp.	0	1	1	1	3	0%	0.8	0.5
<i>Lepidostoma</i> sp.	0	0	2	0	2	0%	0.5	1.0
<i>Brachycentrus occidentalis</i>	249	271	425	220	1165	26%	291.3	91.6
<i>Glossosoma</i> sp.	0	2	0	4	6	0%	1.5	1.9
ANNELIDA						1%	16	
Tubificidae	40	2	2	1	45	1%	11.3	19.2
Erpobdellidae	5	3	7	3	18	0%	4.5	1.9
CRUSTACEA								
<i>Caecidotea</i> sp.	0	1	11	1	13	0%	3.3	5.2
MOLLUSCA						2%	17	
<i>Physella</i> sp.	1	4	51	9	65	1%	16.3	23.4
<i>Gyraulus</i> sp.	0	0	1	1	2	0%	0.5	0.6
<i>Fossaria</i> sp.	0	1	0	0	1	0%	0.3	0.5
<i>Pisidium</i> sp.	0	0	1	0	1	0%	0.3	0.5
ID's by D. McGuire								
TOTAL ORGANISMS	1489	567	1553	793	4402		1101	495
TAXA RICHNESS	33	36	44	35	53		37.0	4.8
SHAN. DIVERSITY	2.85	3.07	3.55	3.42	3.52		3.22	0.32
BIOTIC INDEX	5.04	3.60	4.18	4.20	4.40		4.26	0.59
EPT RICHNESS	14	17	20	16	26		16.8	2.5
% R.A. DOMINANT	46%	48%	27%	28%	26%		37%	11.1%
% R.A. FILTERERS	71%	69%	57%	65%	65%		66%	6%
METALS TOLERANCE	5.26	4.27	4.40	4.57	4.70		4.62	0.44
Baetidae/Ephemeroptera	0.84	0.60	0.58	0.70	0.66		0.68	0.12
Hydropsychinae/Trichoptera	0.34	0.13	0.47	0.27	0.35		0.30	0.14
EPT / (EPT + CHIR.)	0.78	0.86	0.83	0.86	0.83		0.83	0.04
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	2	3	2	4	4		2.8	1.0
# SAND TOLERANT TAXA	4	3	4	4	4		3.8	0.5
# FINE SED TOLERANT TAXA	6	7	13	7	14		8.3	3.2
% SAND TOLERANT	8%	5%	6%	7%	7%		6%	1%
% SEDIMENT TOLERANT	4%	5%	12%	4%	7%		6%	4%
SEDIMENT TOLERANT INDEX	6.25	5.17	5.46	5.57	5.71		5.61	0.45
FSSI	79	99	97	93	118		92.0	9.0

B.16 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Bearmouth Rest Area - STATION 11.7 -6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						4%	97	
<i>Optioservus spp.</i>	52	122	36	104	314	3%	78.5	41.0
<i>Zaitzevia sp.</i>	5	24	12	31	72	1%	18.0	11.7
DIPTERA						17%	441	
<i>Thienemannimyia gp.</i>	19	50	44	14	127	1%	31.8	17.9
<i>Pentaneura sp.</i>	4	7	10	5	26	0%	6.5	2.6
<i>Pagastia sp</i>	1	0	0	1	2	0%	0.5	0.6
<i>Monodiamesa sp.</i>	0	0	0	1	1	0%	0.3	0.5
<i>Cardiocladius spp.</i>	0	0	0	2	2	0%	0.5	1.0
<i>Cricotopus spp.</i>	0	0	11	0	11	0%	2.8	5.5
<i>Eukiefferiella spp.</i>	84	238	53	43	418	4%	104.5	90.7
<i>Nanocladius sp.</i>	0	1	0	0	1	0%	0.3	0.5
<i>Orthocladius spp.</i>	15	1	7	1	24	0%	6.0	6.6
<i>Parametricnemus sp.</i>	23	26	27	6	82	1%	20.5	9.8
<i>Tvetenia sp.</i>	23	71	12	65	171	2%	42.8	29.6
<i>Cryptochironomus sp.</i>	0	10	0	11	21	0%	5.3	6.1
<i>Microtendipes sp</i>	32	74	18	152	276	3%	69.0	60.2
<i>Phaenopsectra sp</i>	0	0	1	0	1	0%	0.3	0.5
<i>Polypedilum spp.</i>	3	54	3	54	114	1%	28.5	29.4
<i>Rheotanytarsus sp.</i>	0	0	7	1	8	0%	2.0	3.4
<i>Tanytarsus sp.</i>	0	2	6	7	15	0%	3.8	3.3
<i>Micropsectra spp.</i>	1	2	0	0	3	0%	0.8	1.0
<i>Antocha sp.</i>	8	0	7	7	22	0%	5.5	3.7
<i>Hexatoma sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Tipula sp.</i>	0	1	1	0	2	0%	0.5	0.6
<i>Atherix pachypus</i>	1	0	0	2	3	0%	0.8	1.0
<i>Simulium spp.</i>	95	177	82	74	428	4%	107.0	47.5
<i>Hemerodromia sp.</i>	1	2	0	0	3	0%	0.8	1.0
<i>Pericoma sp.</i>	0	1	0	0	1	0%	0.3	0.5
EPHEMEROPTERA						38%	955	
<i>Acentrella insignificans</i>	0	1	0	0	1	0%	0.3	0.5
<i>Baetis tricaudatus</i>	49	44	144	59	296	3%	74.0	47.1
<i>Pladitus punctiventris</i>	61	86	58	53	258	3%	64.5	14.7
<i>Dipheter hageni</i>	6	2	6	1	15	0%	3.8	2.6
<i>Attenella margarita</i>	39	25	72	86	222	2%	55.5	28.3
<i>Heptagenia sp.</i>	21	2	9	26	58	1%	14.5	11.0
<i>Paraleptophlebia bicornuta</i>	0	1	0	0	1	0%	0.3	0.5
<i>Paraleptophlebia sp.</i>	16	0	2	1	19	0%	4.8	7.5
<i>Tricorythodes minutus</i>	701	803	789	657	2950	29%	737.5	70.1

B.16 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Bearmouth Rest Area - STATION 11.7 -6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
<b>LEPIDOPTERA</b>								
<i>Petrophila sp.</i>	0	0	1	3	4	0%	1.0	1.4
<b>ODONATA</b>								
<i>Ophiogomphus sp.</i>	0	0	2	5	7	0%	1.8	2.4
<b>PLECOPTERA</b>								
<i>Hesperoperla pacifica</i>	0	0	1	1	2	0%	0.5	0.6
<i>Isogenoides sp.</i>	6	18	8	13	45	0%	11.3	5.4
<i>Skwala sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Isoptera fulva</i>	1	0	0	0	1	0%	0.3	0.5
<b>TRICHOPTERA</b>								
<i>Arctopsyche grandis</i>	1	0	1	0	2	0%	0.5	0.6
<i>Cheumatopsyche spp.</i>	90	31	28	111	260	3%	65.0	41.9
<i>Hydropsyche occidentalis</i>	533	674	225	803	2235	22%	558.8	248.3
<i>Hydropsyche (C) cockerelli</i>	19	22	6	44	91	1%	22.8	15.8
<i>Hydropsyche (C) nr. morosa</i>	4	1	3	9	17	0%	4.3	3.4
<i>Limnephilus sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Hydroptila spp.</i>	54	208	64	96	422	4%	105.5	70.6
<i>Ochrotrichia sp.</i>	48	86	48	25	207	2%	51.8	25.3
<i>Lepidostoma sp.</i>	0	1	0	1	2	0%	0.5	0.6
<i>Ceraclea sp.</i>	0	0	0	1	1	0%	0.3	0.5
<i>Nectopsyche sp.</i>	0	18	1	1	20	0%	5.0	8.7
<i>Oecetis sp.</i>	3	10	0	1	14	0%	3.5	4.5
<i>Brachycentrus occidentalis</i>	6	3	4	1	14	0%	3.5	2.1
<i>Helicopsyche borealis</i>	0	1	0	1	2	0%	0.5	0.6
<i>Glossosoma sp.</i>	1	0	0	0	1	0%	0.3	0.5
<b>ANNELIDA</b>								
Tubificidae	88	92	427	131	738	7%	184.5	162.8
Erpobdellidae	5	1	5	1	12	0%	3.0	2.3
<b>CRUSTACEA</b>								
<i>Hyalella azteca</i>	0	0	1	0	1	0%	0.3	0.5
<b>MOLLUSCA</b>								
<i>Physella sp.</i>	0	2	2	0	4	0%	1.0	1.2
<i>Pisidium sp.</i>	1	2	1	5	9	0%	2.3	1.9
<b>OTHER</b>								
Turbellaria	6	39	3	44	92	1%	23.0	21.5

B.16 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Bearmouth Rest Area - STATION 11.7 -6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	2126	3036	2251	2761	10174		2544	428
TAXA RICHNESS	39	43	46	46	63		43.5	3.3
SHAN. DIVERSITY	3.36	3.59	3.36	3.56	3.63		3.47	0.12
BIOTIC INDEX	4.97	5.25	5.62	5.06	5.22		5.22	0.29
EPT RICHNESS	19	20	20	21	28		20.0	0.8
% R.A. DOMINANT	33%	26%	35%	29%	29%		31%	3.9%
% R.A. FILTERERS	35%	30%	16%	38%	30%		30%	10%
METALS TOLERANCE	4.55	4.75	4.62	4.50	4.61		4.60	0.11
Baetidae/Ephemeroptera	0.13	0.14	0.19	0.13	0.15		0.15	0.03
Hydropsychinae/Trichoptera	0.85	0.69	0.69	0.88	0.79		0.78	0.10
EPT / (EPT + CHIR.)	0.89	0.79	0.88	0.85	0.85		0.85	0.04
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	2	1	2	1	4		1.5	0.6
# SAND TOLERANT TAXA	4	5	6	7	9		5.5	1.3
# FINE SED TOLERANT TAXA	8	13	11	11	18		10.8	2.1
% SAND TOLERANT	3%	6%	3%	5%	4%		4%	2%
% SEDIMENT TOLERANT	43%	31%	56%	34%	40%		41%	11%
SEDIMENT TOLERANT INDEX	6.08	6.07	6.63	5.99	6.18		6.19	0.29
FSBI	100	87	99	88	132		93.5	7.0

B.17 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Bonita - STATION 12 -6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						5%	123	
<i>Optioservus</i> spp.	86	52	32	42	212	2%	53.0	23.5
<i>Zaitzevia</i> sp.	76	80	59	64	279	3%	69.8	9.9
Hydrophiliidae	1	0	0	0	1	0%	0.3	0.5
DIPTERA						22%	508	
<i>Thienemannimyia</i> gp.	53	22	22	29	126	1%	31.5	14.7
<i>Pentaneura</i> sp.	4	3	1	4	12	0%	3.0	1.4
<i>Pagastia</i> sp	4	11	2	0	17	0%	4.3	4.8
<i>Cardiocladius</i> spp.	2	0	2	1	5	0%	1.3	1.0
<i>Corynoneura</i> sp	0	1	0	0	1	0%	0.3	0.5
<i>Cricotopus</i> spp.	5	5	0	7	17	0%	4.3	3.0
<i>Eukiefferiella</i> spp.	12	11	63	24	110	1%	27.5	24.4
<i>Nanocladius</i> sp.	1	0	0	0	1	0%	0.3	0.5
<i>Orthocladius</i> spp.	0	6	12	2	20	0%	5.0	5.3
<i>Parametriocnemus</i> sp.	31	1	0	8	40	0%	10.0	14.4
<i>Rheocricotopus</i> sp.	0	5	0	1	6	0%	1.5	2.4
<i>Tvetenia</i> sp.	43	17	13	24	97	1%	24.3	13.3
<i>Microtendipes</i> sp	34	146	99	104	383	4%	95.8	46.2
<i>Phaenopsectra</i> sp	0	1	0	0	1	0%	0.3	0.5
<i>Polypedium</i> spp.	135	17	34	63	249	3%	62.3	52.1
<i>Rheotanytarsus</i> sp.	0	1	1	0	2	0%	0.5	0.6
<i>Tanytarsus</i> sp.	1	2	2	10	15	0%	3.8	4.2
<i>Micropectra</i> spp.	5	22	0	27	54	1%	13.5	13.0
<i>Antocha</i> sp.	6	37	10	19	72	1%	18.0	13.8
<i>Hexatoma</i> sp.	1	0	0	0	1	0%	0.3	0.5
<i>Tipula</i> sp.	0	0	0	2	2	0%	0.5	1.0
<i>Atherix pachypus</i>	1	2	1	1	5	0%	1.3	0.5
<i>Simulium</i> spp.	420	77	158	137	792	9%	198.0	151.9
<i>Hemerodromia</i> sp.	3	1	0	1	5	0%	1.3	1.3
EPHEMEROPTERA						32%	715	
<i>Acentrella insignificans</i>	0	0	1	0	1	0%	0.3	0.5
<i>Baetis tricaudatus</i>	47	34	74	76	231	3%	57.8	20.6
<i>Pladitus punctiventris</i>	20	40	14	20	94	1%	23.5	11.4
<i>Centroptilum</i> sp.	1	0	1	0	2	0%	0.5	0.6
<i>Dipheter hageni</i>	5	1	1	7	14	0%	3.5	3.0
<i>Attenella margarita</i>	5	55	68	15	143	2%	35.8	30.5
<i>Serratella tibialis</i>	6	0	3	5	14	0%	3.5	2.6
<i>Drunella grandis</i>	0	1	0	0	1	0%	0.3	0.5
<i>Epeorus albertae</i>	1	0	0	0	1	0%	0.3	0.5
<i>Heptagenia</i> sp.	2	2	7	17	28	0%	7.0	7.1
<i>Rhithrogena</i> sp.	0	0	2	0	2	0%	0.5	1.0
<i>Paraleptophlebia</i> sp.	0	0	7	0	7	0%	1.8	3.5
<i>Tricorythodes minutus</i>	975	419	467	461	2322	26%	580.5	263.9

B.17 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Bonita - STATION 12 -6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
HEMIPTERA								
<i>Sigara sp.</i>	2	0	0	0	2	0%	0.5	1.0
LEPIDOPTERA								
<i>Petrophila sp.</i>	1	16	2	15	34	0%	8.5	8.1
ODONATA								
<i>Ophiogomphus sp.</i>	1	2	1	0	4	0%	1.0	0.8
PLECOPTERA								
						1%	16	
<i>Claassenia sabulosa</i>	0	0	0	1	1	0%	0.3	0.5
<i>Hesperoperla pacifica</i>	3	0	0	0	3	0%	0.8	1.5
<i>Isogenoides sp.</i>	15	13	14	14	56	1%	14.0	0.8
<i>Skwala sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Isoperla fulva</i>	0	0	0	1	1	0%	0.3	0.5
<i>Pteronarcella badia</i>	0	0	0	1	1	0%	0.3	0.5
<i>Pteronarcys californica</i>	1	0	0	1	2	0%	0.5	0.6
TRICHOPTERA								
						37%	840	
<i>Cheumatopsyche spp.</i>	183	167	193	98	641	7%	160.3	42.9
<i>Hydropsyche occidentalis</i>	624	410	314	335	1683	19%	420.8	141.6
<i>Hydropsyche (C) cockerelli</i>	16	35	13	44	108	1%	27.0	14.9
<i>Hydropsyche (C) nr. morosa</i>	1	2	3	6	12	0%	3.0	2.2
<i>Hydroptila spp.</i>	298	77	62	103	540	6%	135.0	110.0
<i>Neotrichia sp.</i>	1	2	3	0	6	0%	1.5	1.3
<i>Ochrotrichia sp.</i>	142	59	44	28	273	3%	68.3	50.8
<i>Nectopsyche sp.</i>	2	17	2	4	25	0%	6.3	7.2
<i>Oecetis sp.</i>	2	15	11	10	38	0%	9.5	5.4
<i>Brachycentrus occidentalis</i>	8	4	7	9	28	0%	7.0	2.2
<i>Helicopsyche borealis</i>	3	1	0	0	4	0%	1.0	1.4
<i>Protophila sp.</i>	0	1	0	0	1	0%	0.3	0.5
ANNELIDA								
						2%	47	
Lumbricidae	0	0	0	1	1	0%	0.3	0.5
Naididae	0	1	0	0	1	0%	0.3	0.5
Tubificidae	22	56	82	23	183	2%	45.8	28.9
Erpobdellidae	1	1	0	0	2	0%	0.5	0.6
CRUSTACEA								
<i>Hyalella azteca</i>	1	0	0	0	1	0%	0.3	0.5

B.17 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Bonita - STATION 12 -6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
MOLLUSCA						0%	1	
<i>Physella sp.</i>	0	0	1	1	2	0%	0.5	0.6
<i>Fossaria sp.</i>	0	0	1	0	1	0%	0.3	0.5
OTHER								
Turbellaria	2	7	0	7	16	0%	4.0	3.6
ID's by D. McGuire								
TOTAL ORGANISMS	3315	1958	1910	1873	9056		2264	702
TAXA RICHNESS	51	48	44	46	70		47.3	3.0
SHAN. DIVERSITY	3.38	3.92	3.79	3.95	3.82		3.76	0.26
BIOTIC INDEX	4.90	4.91	5.04	4.90	4.93		4.94	0.07
EPT RICHNESS	23	20	23	21	32		21.8	1.5
% R.A. DOMINANT	29%	21%	24%	25%	26%		25%	3.3%
% R.A. FILTERERS	38%	36%	36%	34%	36%		36%	2%
METALS TOLERANCE	4.51	4.39	4.60	4.41	4.48		4.48	0.10
Baetidae/Ephemeroptera	0.07	0.14	0.14	0.17	0.12		0.13	0.04
Hydropsychinae/Trichoptera	0.64	0.78	0.80	0.76	0.73		0.75	0.07
EPT / (EPT + CHIR.)	0.88	0.83	0.84	0.81	0.84		0.84	0.03
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	3	1	2	1	6		1.8	1.0
# SAND TOLERANT TAXA	8	6	5	5	8		6.0	1.4
# FINE SED TOLERANT TAXA	8	7	8	7	14		7.5	0.6
% SAND TOLERANT	5%	10%	6%	7%	7%		7%	2%
% SEDIMENT TOLERANT	36%	33%	40%	32%	35%		35%	3%
SEDIMENT TOLERANT INDEX	5.97	6.01	6.24	6.00	6.04		6.05	0.12
FSBI	109	89	101	98	140		99.3	8.3

B.18 MACROINVERTEBRATE DATA								
ROCK CREEK near Clinton - STATION 12.5 -6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						3%	35	
<i>Optioservus</i> spp.	2	10	17	6	35	1%	8.8	6.4
<i>Zaitzevia</i> sp.	8	21	52	19	100	2%	25.0	18.9
<i>Narpus concolor</i>	1	0	0	0	1	0%	0.3	0.5
<i>Ordobrevia</i> sp.	1	4	0	0	5	0%	1.3	1.9
DIPTERA						60%	686	
<i>Thienemannimyia</i> gp.	0	9	0	2	11	0%	2.8	4.3
<i>Pagastia</i> sp	80	85	47	36	248	5%	62.0	24.2
<i>Potthastia</i> spp.	17	4	1	5	27	1%	6.8	7.0
<i>Cardiocladius</i> spp.	3	2	1	1	7	0%	1.8	1.0
<i>Cricotopus</i> spp.	48	42	12	36	138	3%	34.5	15.8
<i>Cricotopus nostococcladius</i>	2	14	6	7	29	1%	7.3	5.0
<i>Eukiefferiella</i> spp.	36	20	36	50	142	3%	35.5	12.3
<i>Orthocladus</i> spp.	39	19	9	24	91	2%	22.8	12.5
<i>Parametriochnemus</i> sp.	1	0	0	0	1	0%	0.3	0.5
<i>Thienemannella</i> sp.	0	1	1	2	4	0%	1.0	0.8
<i>Tvetenia</i> sp.	1	3	4	1	9	0%	2.3	1.5
<i>Microtendipes</i> sp	4	16	0	5	25	1%	6.3	6.8
<i>Polypedium</i> spp.	2	17	14	11	44	1%	11.0	6.5
<i>Rheotanytarsus</i> sp.	0	0	4	5	9	0%	2.3	2.6
<i>Sublettia</i> sp.	5	14	4	2	25	1%	6.3	5.3
<i>Micropectra</i> spp.	614	739	351	112	1816	40%	454.0	279.5
<i>Antocha</i> sp.	27	36	9	13	85	2%	21.3	12.5
<i>Hexatoma</i> sp.	0	3	1	5	9	0%	2.3	2.2
<i>Limnophila</i> sp.	6	0	1	0	7	0%	1.8	2.9
<i>Ceratopogoninae</i>	0	0	1	0	1	0%	0.3	0.5
<i>Atherix pachypus</i>	0	1	1	2	4	0%	1.0	0.8
<i>Simulium</i> spp.	1	0	3	5	9	0%	2.3	2.2
<i>Chelifera</i> sp.	1	0	0	0	1	0%	0.3	0.5
EPHEMEROPTERA						8%	89	
<i>Acentrella insignificans</i>	9	7	6	13	35	1%	8.8	3.1
<i>Baetis tricaudatus</i>	1	6	21	3	31	1%	7.8	9.1
<i>Attenella margarita</i>	7	31	13	28	79	2%	19.8	11.6
<i>Serratella tibialis</i>	1	3	23	12	39	1%	9.8	10.0
<i>Drunella coloradensis</i>	0	1	1	0	2	0%	0.5	0.6
<i>Drunella grandis</i>	1	1	1	2	5	0%	1.3	0.5
<i>Timpano hecuba</i>	1	5	0	1	7	0%	1.8	2.2
<i>Epeorus</i> spp.	6	17	27	21	71	2%	17.8	8.8
<i>Nixe</i> sp.	19	28	13	15	75	2%	18.8	6.7
<i>Rhithrogena</i> sp.	1	0	0	0	1	0%	0.3	0.5
<i>Paraleptophlebia bicornuta</i>	1	1	0	0	2	0%	0.5	0.6
<i>Paraleptophlebia</i> sp.	0	3	2	0	5	0%	1.3	1.5
<i>Tricorythodes minutus</i>	2	1	1	1	5	0%	1.3	0.5



B.18                      MACROINVERTEBRATE    DATA								
ROCK CREEK near Clinton - STATION 12.5 -6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	1118	1464	1110	845	4537		1134	254
TAXA RICHNESS	47	50	49	47	67		48.3	1.5
SHAN. DIVERSITY	2.87	2.98	3.46	3.75	3.41		3.27	0.42
BIOTIC INDEX	3.89	3.61	3.37	3.42	3.58		3.57	0.23
EPT RICHNESS	22	27	24	24	34		24.3	2.1
% R.A. DOMINANT	55%	50%	32%	37%	40%		43%	11%
% R.A. FILTERERS	12%	19%	35%	44%	26%		28%	14%
METALS TOLERANCE	2.89	2.60	2.93	3.65	2.95		3.02	0.45
Baetidae/Ephemeroptera	0.20	0.13	0.25	0.17	0.18		0.19	0.05
Hydropsychinae/Trichoptera	0.21	0.08	0.11	0.10	0.11		0.13	0.06
EPT / (EPT + CHIR.)	0.19	0.29	0.51	0.62	0.38		0.40	0.20
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	7	7	8	7	9		7.3	0.5
# SAND TOLERANT TAXA	5	6	4	4	7		4.8	1.0
# FINE SED TOLERANT TAXA	8	7	10	6	14		7.8	1.7
% SAND TOLERANT	3%	5%	7%	5%	5%		5%	1%
% SEDIMENT TOLERANT	4%	3%	3%	3%	3%		3%	1%
SEDIMENT TOLERANT INDEX	5.98	5.66	5.28	5.23	5.57		5.54	0.35
FSBI	133	146	154	143	192		144.0	8.7

B.19 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Turah - STATION 13 - 6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						10%	108	
<i>Optioservus spp.</i>	52	43	58	61	214	5%	53.5	7.9
<i>Zaitzevia sp.</i>	16	59	71	70	216	5%	54.0	25.9
DIPTERA						29%	327	
<i>Thienemannimyia gp.</i>	7	11	17	10	45	1%	11.3	4.2
<i>Pagastia sp</i>	16	47	20	19	102	2%	25.5	14.4
<i>Potthastia spp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Cardiocladius spp.</i>	11	3	16	2	32	1%	8.0	6.7
<i>Cricotopus spp.</i>	19	7	30	4	60	1%	15.0	11.9
<i>Cricotopus nostococladius</i>	3	0	0	0	3	0%	0.8	1.5
<i>Eukiefferiella spp.</i>	81	16	36	48	181	4%	45.3	27.2
<i>Orthocladus spp.</i>	17	5	36	12	70	2%	17.5	13.3
<i>Rheocricotopus sp.</i>	3	0	0	0	3	0%	0.8	1.5
<i>Tvetenia sp.</i>	13	1	2	12	28	1%	7.0	6.4
<i>Microtendipes sp</i>	11	34	33	16	94	2%	23.5	11.7
<i>Polypedilum spp.</i>	49	13	23	26	111	2%	27.8	15.2
<i>Cladotanytarsus sp.</i>	0	0	0	2	2	0%	0.5	1.0
<i>Rheotanytarsus sp.</i>	19	14	7	17	57	1%	14.3	5.3
<i>Tanytarsus sp.</i>	0	0	2	0	2	0%	0.5	1.0
<i>Micropectra spp.</i>	6	82	69	62	219	5%	54.8	33.5
<i>Antocha sp.</i>	43	49	43	44	179	4%	44.8	2.9
<i>Simulium spp.</i>	34	15	8	54	111	2%	27.8	20.7
<i>Chellifera sp.</i>	0	0	2	3	5	0%	1.3	1.5
<i>Hemerodromia sp.</i>	3	0	0	1	4	0%	1.0	1.4
EPHEMEROPTERA						16%	179	
<i>Acentrella insignificans</i>	19	11	27	10	67	1%	16.8	7.9
<i>Baetis tricaudatus</i>	93	8	26	17	144	3%	36.0	38.7
<i>Centroptilum sp.</i>	0	0	0	1	1	0%	0.3	0.5
<i>Dipheter hageni</i>	2	2	3	1	8	0%	2.0	0.8
<i>Attenella margarita</i>	12	38	51	35	136	3%	34.0	16.2
<i>Serratella tibialis</i>	33	29	22	16	100	2%	25.0	7.5
<i>Drunella grandis</i>	2	4	3	13	22	0%	5.5	5.1
<i>Epeorus albertae</i>	2	1	1	3	7	0%	1.8	1.0
<i>Heptagenia sp.</i>	0	0	2	0	2	0%	0.5	1.0
<i>Nixe sp.</i>	6	19	16	7	48	1%	12.0	6.5
<i>Rhithrogena sp.</i>	8	2	1	3	14	0%	3.5	3.1
<i>Paraleptophlebia bicornuta</i>	0	0	1	0	1	0%	0.3	0.5
<i>Paraleptophlebia sp.</i>	0	0	0	0	0	0%	0.0	0.0
<i>Tricorythodes minutus</i>	26	36	65	37	164	4%	41.0	16.8



B.19 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Turah - STATION 13 -6 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	1274	920	1280	1038	4512		1128	179
TAXA RICHNESS	46	39	46	50	61		45.3	4.6
SHAN. DIVERSITY	4.47	4.52	4.64	4.64	4.73		4.56	0.09
BIOTIC INDEX	4.52	4.29	4.34	4.64	4.45		4.45	0.16
EPT RICHNESS	26	22	26	29	34		25.8	2.9
% R.A. DOMINANT	14%	13%	9%	14%	11%		13%	2.3%
% R.A. FILTERERS	41%	20%	30%	25%	30%		29%	9%
METALS TOLERANCE	4.41	3.87	4.03	4.12	4.13		4.11	0.23
Baetidae/Ephemeroptera	0.56	0.14	0.26	0.20	0.31		0.29	0.19
Hydropsychinae/Trichoptera	0.55	0.38	0.47	0.42	0.47		0.45	0.08
EPT / (EPT + CHIR.)	0.76	0.66	0.72	0.69	0.71		0.71	0.04
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	7	6	7	7	7		6.8	0.5
# SAND TOLERANT TAXA	4	3	4	5	5		4.0	0.8
# FINE SED TOLERANT TAXA	5	4	8	5	11		5.5	1.7
% SAND TOLERANT	9%	16%	14%	17%	14%		14%	4%
% SEDIMENT TOLERANT	4%	10%	10%	8%	8%		8%	3%
SEDIMENT TOLERANT INDEX	5.49	5.68	5.57	5.71	5.60		5.61	0.10
FSBI	130	117	132	131	144		127.5	7.0

B.20 MACROINVERTEBRATE DATA								
BLACKFOOT RIVER at USGS gage near mouth - STATION 14 -5 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						5%	38	
<i>Optioservus</i> spp.	15	30	26	10	81	3%	20.3	9.3
<i>Zaitzevia</i> sp.	9	28	15	17	69	2%	17.3	7.9
DIPTERA						63%	456	
<i>Thienemannimyia</i> gp.	2	2	0	2	6	0%	1.5	1.0
<i>Pagastia</i> sp	3	2	0	0	5	0%	1.3	1.5
<i>Cricotopus</i> spp.	3	1	10	0	14	0%	3.5	4.5
<i>Eukiefferiella</i> spp.	14	3	9	2	28	1%	7.0	5.6
<i>Orthocladius</i> spp.	12	8	4	1	25	1%	6.3	4.8
<i>Synorthocladius</i> sp.	0	0	0	1	1	0%	0.3	0.5
<i>Tvetenia</i> sp.	4	0	0	2	6	0%	1.5	1.9
<i>Microtendipes</i> sp	5	1	3	1	10	0%	2.5	1.9
<i>Polypedilum</i> spp.	19	7	6	8	40	1%	10.0	6.1
<i>Xenochironomus</i> sp.	0	1	0	0	1	0%	0.3	0.5
<i>Rheotanytarsus</i> sp.	0	0	1	2	3	0%	0.8	1.0
<i>Sublettia</i> sp.	2	2	1	2	7	0%	1.8	0.5
<i>Micropsectra</i> spp.	199	580	349	496	1624	56%	406.0	167.8
<i>Antocha</i> sp.	11	9	5	9	34	1%	8.5	2.5
<i>Hexatoma</i> sp.	1	3	5	7	16	1%	4.0	2.6
<i>Simulium</i> spp.	1	0	0	0	1	0%	0.3	0.5
<i>Chelifera</i> sp.	1	0	1	0	2	0%	0.5	0.6
EPHEMEROPTERA						6%	43	
<i>Acentrella insignificans</i>	9	3	3	3	18	1%	4.5	3.0
<i>Baetis tricaudatus</i>	9	5	1	10	25	1%	6.3	4.1
<i>Dipheter hageni</i>	2	0	0	2	4	0%	1.0	1.2
<i>Attenella margarita</i>	0	1	2	1	4	0%	1.0	0.8
<i>Serratella tibialis</i>	22	11	18	9	60	2%	15.0	6.1
<i>Drunella doddsi</i>	0	0	1	0	1	0%	0.3	0.5
<i>Drunella grandis</i>	12	4	1	2	19	1%	4.8	5.0
<i>Epeorus albertae</i>	27	4	1	2	34	1%	8.5	12.4
<i>Nixe</i> sp.	1	0	0	0	1	0%	0.3	0.5
<i>Tricorythodes minutus</i>	3	1	0	2	6	0%	1.5	1.3
LEPIDOPTERA								
<i>Petrophila</i> sp.	0	1	2	0	3	0%	0.8	1.0
PLECOPTERA						1%	10	
<i>Claassenia sabulosa</i>	4	2	2	3	11	0%	2.8	1.0
<i>Hesperoperla pacifica</i>	0	1	0	0	1	0%	0.3	0.5
<i>Calineruria californica</i>	7	6	3	1	17	1%	4.3	2.8
<i>Pteronarcys californica</i>	6	0	1	1	8	0%	2.0	2.7
<i>Chloroperlinae</i>	1	1	0	1	3	0%	0.8	0.5

B.20 MACROINVERTEBRATE DATA								
BLACKFOOT RIVER at USGS gage near mouth - STATION 14 -5 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TRICHOPTERA						23%	166	
<i>Arctopsyche grandis</i>	12	3	8	5	28	1%	7.0	3.9
<i>Cheumatopsyche</i> spp.	29	13	18	17	77	3%	19.3	6.8
<i>Hydropsyche occidentalis</i>	60	3	5	15	83	3%	20.8	26.7
<i>Hydropsyche</i> (C) <i>cockerelli</i>	124	33	29	54	240	8%	60.0	44.1
<i>Hydropsyche osleri</i> ?	1	0	1	0	2	0%	0.5	0.6
<i>Dicosmoecus</i> sp.	0	0	1	2	3	0%	0.8	1.0
<i>Neotrichia</i> sp.	0	0	0	1	1	0%	0.3	0.5
<i>Lepidostoma</i> sp.	0	0	0	2	2	0%	0.5	1.0
<i>Ceraclea</i> sp.	0	1	0	0	1	0%	0.3	0.5
<i>Wormaldia</i> sp.	0	0	2	0	2	0%	0.5	1.0
<i>Psychomyia flavida</i>	0	0	0	1	1	0%	0.3	0.5
<i>Brachycentrus americanus</i>	1	0	0	0	1	0%	0.3	0.5
<i>Brachycentrus occidentalis</i>	89	7	15	25	136	5%	34.0	37.4
<i>Rhyacophila angelita</i> gp.	2	3	3	4	12	0%	3.0	0.8
<i>Protoptila</i> sp.	3	0	0	1	4	0%	1.0	1.4
<i>Glossosoma</i> sp.	28	21	7	15	71	2%	17.8	8.9
ANNELIDA						0%	3	
Lumbriculidae	1	6	6	0	13	0%	3.3	3.2
MOLLUSCA						0%	2	
<i>Physella</i> sp.	0	4	1	2	7	0%	1.8	1.7
<i>Ferrissia</i> sp.	0	2	0	0	2	0%	0.5	1.0
OTHER								
Turbellaria	6	15	4	7	32	1%	8.0	4.8
Porifera	1	1	1	0	3	0%	0.8	0.5
ID's by D. McGuire								

B.20 MACROINVERTEBRATE DATA								
BLACKFOOT RIVER at USGS gage near mouth - STATION 14 -5 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	761	829	571	748	2909		727	110
TAXA RICHNESS	41	39	38	40	56		39.5	1.3
SHAN. DIVERSITY	3.84	2.21	2.69	2.38	2.97		2.78	0.73
BIOTIC INDEX	3.65	3.90	3.97	3.83	3.83		3.84	0.13
EPT RICHNESS	22	19	20	24	31		21.3	2.2
% R.A. DOMINANT	26%	70%	61%	66%	56%		56%	20%
% R.A. FILTERERS	42%	7%	14%	16%	20%		20%	15%
METALS TOLERANCE	2.96	1.82	2.16	1.87	2.20		2.20	0.52
Baetidae/Ephemeroptera	0.24	0.28	0.15	0.48	0.27		0.29	0.14
Hydropsychinae/Trichoptera	0.61	0.58	0.61	0.62	0.61		0.61	0.02
EPT / (EPT + CHIR.)	0.63	0.17	0.24	0.26	0.33		0.32	0.21
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	7	5	7	6	9		6.3	1.0
# SAND TOLERANT TAXA	4	5	4	4	5		4.3	0.5
# FINE SED TOLERANT TAXA	4	3	4	4	7		3.8	0.5
% SAND TOLERANT	5%	9%	9%	6%	7%		7%	2%
% SEDIMENT TOLERANT	4%	2%	4%	3%	3%		3%	1%
SEDIMENT TOLERANT INDEX	5.32	5.78	5.85	5.73	5.66		5.67	0.24
FSBI	120	105	118	116	151		114.8	6.7

B.21 MACROINVERTEBRATE DATA								
CLARK FORK RIVER above Missoula - STATION 15.5 -4 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						13%	287	
<i>Optioservus spp.</i>	95	83	209	167	554	6%	138.5	59.9
<i>Zaitzevia sp.</i>	225	46	151	108	530	6%	132.5	75.2
<i>Cleptelmis ornata</i>	1	0	2	61	64	1%	16.0	30.0
DIPTERA						54%	1157	
<i>Thienemannimyia gp.</i>	24	2	4	24	54	1%	13.5	12.2
<i>Nilotanyus sp.</i>	0	0	0	3	3	0%	0.8	1.5
<i>Pentaneura sp.</i>	1	0	0	0	1	0%	0.3	0.5
<i>Pagastia sp.</i>	2	1	6	31	40	0%	10.0	14.2
<i>Potthastia spp.</i>	0	2	0	1	3	0%	0.8	1.0
<i>Corynoneura sp.</i>	0	2	0	1	3	0%	0.8	1.0
<i>Cricotopus spp.</i>	50	39	48	66	203	2%	50.8	11.2
<i>Cricotopus nostococladus</i>	33	80	10	2	125	1%	31.3	35.1
<i>Eukiefferiella spp.</i>	119	145	110	105	479	6%	119.8	17.8
<i>Nanocladius sp.</i>	10	19	18	1	48	1%	12.0	8.4
<i>Orthocladus spp.</i>	3	31	1	1	36	0%	9.0	14.7
<i>Parametriochnemus sp.</i>	0	0	12	7	19	0%	4.8	5.9
<i>Synorthocladus sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Tvetenia sp.</i>	17	6	5	62	90	1%	22.5	26.9
<i>Cryptochironomus sp.</i>	3	0	0	0	3	0%	0.8	1.5
<i>Microtendipes sp.</i>	273	72	39	300	684	8%	171.0	134.5
<i>Polypedium spp.</i>	364	334	275	641	1614	19%	403.5	162.6
<i>Rheotanytarsus sp.</i>	4	1	1	0	6	0%	1.5	1.7
<i>Micropsectra spp.</i>	101	61	343	502	1007	12%	251.8	208.2
<i>Antocha sp.</i>	44	60	12	30	146	2%	36.5	20.4
<i>Atherix pachypus</i>	0	1	0	0	1	0%	0.3	0.5
<i>Simulium spp.</i>	2	2	47	1	52	1%	13.0	22.7
<i>Chelifera sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Hemerodromia sp.</i>	1	2	2	2	7	0%	1.8	0.5
EPHEMEROPTERA						5%	118	
<i>Acentrella insignificans</i>	0	1	0	0	1	0%	0.3	0.5
<i>Baetis tricaudatus</i>	12	1	21	62	96	1%	24.0	26.6
<i>Pladitus punctiventris</i>	0	0	2	0	2	0%	0.5	1.0
<i>Dipheter hageni</i>	16	4	2	1	23	0%	5.8	6.9
<i>Attenella margarita</i>	5	5	8	3	21	0%	5.3	2.1
<i>Serratella tibialis</i>	0	7	24	3	34	0%	8.5	10.7
<i>Timpano hecuba</i>	2	0	0	1	3	0%	0.8	1.0
<i>Epeorus albertae</i>	3	0	4	0	7	0%	1.8	2.1
<i>Heptagenia sp.</i>	2	0	0	0	2	0%	0.5	1.0
<i>Nixe sp.</i>	6	0	0	0	6	0%	1.5	3.0
<i>Paraleptophlebia bicornuta</i>	1	0	0	0	1	0%	0.3	0.5
<i>Paraleptophlebia sp.</i>	1	0	0	3	4	0%	1.0	1.4
<i>Tricorythodes minutus</i>	97	16	12	145	270	3%	67.5	64.8



B.21 MACROINVERTEBRATE DATA								
CLARK FORK RIVER above Missoula - STATION 15.5 -4 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	2205	1371	1942	3062	8580		2145	704
TAXA RICHNESS	44	45	45	44	65		44.5	0.6
SHAN. DIVERSITY	4.11	3.98	4.02	3.95	4.24		4.01	0.07
BIOTIC INDEX	5.20	5.48	4.84	4.93	5.07		5.11	0.29
EPT RICHNESS	19	18	17	18	30		18.0	0.8
% R.A. DOMINANT	17%	24%	18%	21%	19%		20%	3.5%
% R.A. FILTERERS	7%	4%	21%	14%	12%		11%	8%
METALS TOLERANCE	4.25	4.50	4.14	3.94	4.15		4.21	0.24
Baetidae/Ephemeroptera	0.19	0.18	0.34	0.29	0.26		0.25	0.08
Hydropsychinae/Trichoptera	0.36	0.15	0.59	0.53	0.46		0.41	0.20
EPT / (EPT + CHIR.)	0.34	0.22	0.37	0.31	0.32		0.31	0.06
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	2	3	3	3	6		2.8	0.5
# SAND TOLERANT TAXA	5	4	5	5	6		4.8	0.5
# FINE SED TOLERANT TAXA	9	6	7	6	14		7.0	1.4
% SAND TOLERANT	17%	14%	19%	12%	15%		15%	3%
% SEDIMENT TOLERANT	7%	3%	4%	8%	6%		6%	2%
SEDIMENT TOLERANT INDEX	5.98	6.22	5.90	6.12	6.05		6.06	0.14
FSBI	90	100	107	101	141		99.5	7.0



B.22 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Shuffield's - STATION 18 -4 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
<b>LEPIDOPTERA</b>								
<i>Petrophila sp.</i>	15	79	73	84	251	4%	62.8	32.1
<b>PLECOPTERA</b>						1%	13	
<i>Hesperoperla pacifica</i>	0	2	3	0	5	0%	1.3	1.5
<i>Calineria californica</i>	0	0	0	1	1	0%	0.3	0.5
<i>Isogenoides sp.</i>	7	4	14	10	35	1%	8.8	4.3
<i>Skwala sp.</i>	2	0	4	1	7	0%	1.8	1.7
<i>Pteronarcys californica</i>	0	0	1	0	1	0%	0.3	0.5
<i>Chloroperlinae</i>	1	0	0	0	1	0%	0.3	0.5
<b>TRICHOPTERA</b>						57%	870	
<i>Arctopsyche grandis</i>	22	33	59	44	158	3%	39.5	15.8
<i>Cheumatopsyche spp.</i>	66	106	307	198	677	11%	169.3	107.2
<i>Hydropsyche occidentalis</i>	172	210	446	631	1459	24%	364.8	214.9
<i>Hydropsyche (C) cockerelli</i>	69	104	220	203	596	10%	149.0	73.9
<i>Hydroptila spp.</i>	22	24	37	12	95	2%	23.8	10.3
<i>Leucotrichia pictipes</i>	3	0	5	0	8	0%	2.0	2.4
<i>Neotrichia sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Ochrotrichia sp.</i>	1	0	0	0	1	0%	0.3	0.5
<i>Lepidostoma sp.</i>	1	0	1	0	2	0%	0.5	0.6
<i>Oecetis sp.</i>	2	3	2	2	9	0%	2.3	0.5
<i>Psychomyia flavida</i>	2	1	21	2	26	0%	6.5	9.7
<i>Brachycentrus occidentalis</i>	100	91	145	108	444	7%	111.0	23.7
<i>Rhyacophila angelita gp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Glossosoma sp.</i>	0	1	2	0	3	0%	0.8	1.0
<b>ANNELIDA</b>						0%	3	
Lumbricidae	0	0	2	0	2	0%	0.5	1.0
Tubificidae	1	3	0	3	7	0%	1.8	1.5
Erpobdellidae	0	1	1	0	2	0%	0.5	0.6
<b>MOLLUSCA</b>						1%	8	
<i>Physella sp.</i>	8	1	12	2	23	0%	5.8	5.2
<i>Ferrissia sp.</i>	0	1	6	1	8	0%	2.0	2.7
<i>Pisidium sp.</i>	0	0	0	1	1	0%	0.3	0.5
ID's by D. McGuire								

B.22 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Shuffield's - STATION 18 -4 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	970	1187	2086	1893	6136		1534	539
TAXA RICHNESS	45	42	50	41	65		44.5	4.0
SHAN. DIVERSITY	4.27	4.03	3.99	3.56	4.03		3.96	0.29
BIOTIC INDEX	4.42	4.65	4.68	4.67	4.63		4.60	0.12
EPT RICHNESS	24	20	27	19	31		22.5	3.7
% R.A. DOMINANT	18%	18%	21%	33%	24%		23%	7.4%
% R.A. FILTERERS	45%	47%	57%	64%	55%		53%	9%
METALS TOLERANCE	4.42	4.34	4.59	4.37	4.44		4.43	0.11
Baetidae/Ephemeroptera	0.34	0.24	0.48	0.35	0.35		0.35	0.10
Hydropsychinae/Trichoptera	0.67	0.73	0.78	0.86	0.79		0.76	0.08
EPT / (EPT + CHIR.)	0.72	0.70	0.73	0.80	0.75		0.74	0.04
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	3	5	5	3	5		4.0	1.2
# SAND TOLERANT TAXA	2	3	3	4	4		3.0	0.8
# FINE SED TOLERANT TAXA	10	9	9	7	13		8.8	1.3
% SAND TOLERANT	0%	1%	0%	1%	1%		1%	0%
% SEDIMENT TOLERANT	21%	20%	20%	16%	19%		19%	2%
SEDIMENT TOLERANT INDEX	5.68	5.71	5.83	5.60	5.71		5.71	0.10
FSBI	102	97	117	97	142		103.3	9.5

B.23 MACROINVERTEBRATE DATA								
BITTERROOT RIVER near mouth - STATION 19 -4 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						8%	56	
<i>Optioservus</i> spp.	37	37	69	34	177	7%	44.3	16.6
<i>Zaitzevia</i> sp.	15	10	7	13	45	2%	11.3	3.5
<i>Cleptelmis ornata</i>	1	0	0	0	1	0%	0.3	0.5
DIPTERA						20%	135	
<i>Pagastia</i> sp	9	2	0	4	15	1%	3.8	3.9
<i>Potthastia</i> spp.	0	0	4	5	9	0%	2.3	2.6
<i>Cardiocladius</i> spp.	13	1	3	1	18	1%	4.5	5.7
<i>Cricotopus</i> spp.	0	0	61	29	90	3%	22.5	29.1
<i>Eukiefferiella</i> spp.	3	3	5	3	14	1%	3.5	1.0
<i>Orthocladius</i> spp.	3	3	30	21	57	2%	14.3	13.5
<i>Synorthocladius</i> sp.	0	0	2	1	3	0%	0.8	1.0
<i>Thienemanniella</i> sp.	4	0	2	0	6	0%	1.5	1.9
<i>Tvetenia</i> sp.	0	1	11	4	16	1%	4.0	5.0
<i>Microtendipes</i> sp	1	0	0	5	6	0%	1.5	2.4
<i>Polypedilum</i> spp.	9	13	90	21	133	5%	33.3	38.2
<i>Xenochironomus</i> sp.	3	0	0	0	3	0%	0.8	1.5
<i>Rheotanytarsus</i> sp.	7	22	32	30	91	3%	22.8	11.4
<i>Microspectra</i> spp.	24	17	10	6	57	2%	14.3	7.9
<i>Antocha</i> sp.	1	0	2	3	6	0%	1.5	1.3
<i>Simulium</i> spp.	10	0	0	0	10	0%	2.5	5.0
<i>Chelifera</i> sp.	0	3	1	1	5	0%	1.3	1.3
EPHEMEROPTERA						17%	113	
<i>Acentrella insignificans</i>	3	4	6	1	14	1%	3.5	2.1
<i>Baetis tricaudatus</i>	15	4	31	0	50	2%	12.5	13.9
<i>Diphetero hageni</i>	1	0	11	1	13	0%	3.3	5.2
<i>Attenella margarita</i>	23	31	44	32	130	5%	32.5	8.7
<i>Serratella tibialis</i>	12	21	71	4	108	4%	27.0	30.1
<i>Drunella grandis</i>	4	10	3	4	21	1%	5.3	3.2
<i>Timpango hecuba</i>	0	1	0	0	1	0%	0.3	0.5
<i>Epeorus albertae</i>	0	1	2	0	3	0%	0.8	1.0
<i>Nixe</i> sp.	4	3	17	25	49	2%	12.3	10.6
<i>Rhithrogena</i> sp.	1	2	7	0	10	0%	2.5	3.1
<i>Tricorythodes minutus</i>	2	4	31	15	52	2%	13.0	13.3
LEPIDOPTERA								
<i>Petrophila</i> sp.	8	6	0	4	18	1%	4.5	3.4
PLECOPTERA						2%	12	
<i>Claassenia sabulosa</i>	0	1	5	1	7	0%	1.8	2.2
<i>Megarcys</i> sp.	0	0	1	0	1	0%	0.3	0.5
<i>Isogenoides</i> sp.	2	2	11	2	17	1%	4.3	4.5
<i>Skwala</i> sp.	0	2	2	1	5	0%	1.3	1.0
<i>Pteronarcella badia</i>	2	2	12	0	16	1%	4.0	5.4
<i>Pteronarcys californica</i>	0	1	0	0	1	0%	0.3	0.5

B.23 MACROINVERTEBRATE DATA								
BITTERROOT RIVER near mouth - STATION 19 -4 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TRICHOPTERA						48%	327	
<i>Arctopsyche grandis</i>	3	7	15	7	32	1%	8.0	5.0
<i>Cheumatopsyche</i> spp.	37	23	29	53	142	5%	35.5	13.0
<i>Hydropsyche occidentalis</i>	188	103	266	269	826	30%	206.5	78.5
<i>Hydropsyche (C) cockerelli</i>	6	20	20	10	56	2%	14.0	7.1
<i>Hydroptila</i> spp.	0	1	17	12	30	1%	7.5	8.3
<i>Ceraclea</i> sp.	0	0	1	0	1	0%	0.3	0.5
<i>Brachycentrus americanus</i>	0	0	2	0	2	0%	0.5	1.0
<i>Brachycentrus occidentalis</i>	0	0	19	14	33	1%	8.3	9.7
<i>Protophila</i> sp.	3	2	0	0	5	0%	1.3	1.5
<i>Glossosoma</i> sp.	18	64	74	25	181	7%	45.3	27.9
ANNELIDA						2%	14	
Lumbricidae	5	7	17	8	37	1%	9.3	5.3
Lumbriculidae	3	3	0	6	12	0%	3.0	2.4
Naididae	0	3	2	2	7	0%	1.8	1.3
<i>Helobdella stagnalis</i>	0	0	0	1	1	0%	0.3	0.5
OTHER								
Turbellaria	10	13	13	34	70	3%	17.5	11.1
Porifera	1	0	0	0	1	0%	0.3	0.5
ID's by D. McGuire								
TOTAL ORGANISMS	491	453	1058	712	2714		679	278
TAXA RICHNESS	37	38	42	39	54		39.0	2.2
SHAN. DIVERSITY	3.72	4.07	4.20	3.76	4.20		3.94	0.24
BIOTIC INDEX	4.37	3.74	4.30	4.62	4.30		4.26	0.37
EPT RICHNESS	17	22	24	17	27		20.0	3.6
% R.A. DOMINANT	38%	23%	25%	38%	30%		31%	8.2%
% R.A. FILTERERS	51%	39%	36%	54%	44%		45%	9%
METALS TOLERANCE	4.29	3.44	4.04	4.23	4.04		4.00	0.39
Baetidae/Ephemeroptera	0.29	0.10	0.22	0.02	0.17		0.16	0.12
Hydropsychinae/Trichoptera	0.91	0.66	0.71	0.85	0.78		0.78	0.11
EPT / (EPT + CHIR.)	0.81	0.83	0.74	0.79	0.78		0.79	0.04
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	5	7	6	3	8		5.3	1.7
# SAND TOLERANT TAXA	4	2	4	3	5		3.3	1.0
# FINE SED TOLERANT TAXA	3	4	5	6	6		4.5	1.3
% SAND TOLERANT	11%	10%	7%	7%	8%		9%	2%
% SEDIMENT TOLERANT	9%	7%	8%	14%	10%		9%	3%
SEDIMENT TOLERANT INDEX	5.54	5.29	5.59	5.56	5.52		5.49	0.14
FSBI	91	100	125	93	136		102.3	15.6

B.24 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Harper Bridge - STATION 20 -4 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						3%	25	
<i>Optioservus spp.</i>	12	29	3	19	63	2%	15.8	11.0
<i>Zaitzevia sp.</i>	4	1	0	7	12	0%	3.0	3.2
<i>Oreodytes spp.</i>	3	6	8	7	24	1%	6.0	2.2
DIPTERA						22%	181	
<i>Thienemannimyia gp.</i>	5	5	4	12	26	1%	6.5	3.7
<i>Pagastia sp</i>	0	1	0	0	1	0%	0.3	0.5
<i>Potthastia spp.</i>	10	5	24	16	55	2%	13.8	8.2
<i>Cardiocladius spp.</i>	4	13	0	11	28	1%	7.0	6.1
<i>Cricotopus spp.</i>	20	35	26	76	157	5%	39.3	25.3
<i>Eukiefferiella spp.</i>	1	2	2	2	7	0%	1.8	0.5
<i>Orthocladius spp.</i>	4	4	4	23	35	1%	8.8	9.5
<i>Tvetenia sp.</i>	3	1	0	8	12	0%	3.0	3.6
<i>Stenochironomus sp.</i>	2	0	0	0	2	0%	0.5	1.0
<i>Microtendipes sp</i>	15	2	23	3	43	1%	10.8	10.1
<i>Phaenopsectra sp</i>	1	0	3	0	4	0%	1.0	1.4
<i>Polypedilum spp.</i>	69	56	66	88	279	8%	69.8	13.4
<i>Cladotanytarsus sp.</i>	1	0	0	1	2	0%	0.5	0.6
<i>Rheotanytarsus sp.</i>	4	10	1	9	24	1%	6.0	4.2
<i>Tanytarsus sp.</i>	0	0	1	1	2	0%	0.5	0.6
<i>Micropsectra spp.</i>	3	5	13	16	37	1%	9.3	6.2
<i>Antocha sp.</i>	0	1	1	0	2	0%	0.5	0.6
<i>Simulium spp.</i>	3	0	0	0	3	0%	0.8	1.5
<i>Chelifera sp.</i>	0	3	2	0	5	0%	1.3	1.5
<i>Hemerodromia sp.</i>	0	0	0	1	1	0%	0.3	0.5
EPHEMEROPTERA						44%	365	
<i>Acentrella insignificans</i>	21	5	1	14	41	1%	10.3	9.0
<i>Baetis tricaudatus</i>	12	7	4	18	41	1%	10.3	6.1
<i>Diphetor hageni</i>	3	4	2	7	16	0%	4.0	2.2
<i>Attenella margarita</i>	40	145	38	117	340	10%	85.0	54.3
<i>Serratella tibialis</i>	2	3	1	0	6	0%	1.5	1.3
<i>Ephemerella inermis</i>	1	0	0	0	1	0%	0.3	0.5
<i>Timpango hecuba</i>	0	1	2	1	4	0%	1.0	0.8
<i>Epeorus albertae</i>	1	0	0	0	1	0%	0.3	0.5
<i>Heptagenia sp.</i>	3	0	0	0	3	0%	0.8	1.5
<i>Nixe sp.</i>	22	17	17	20	76	2%	19.0	2.4
<i>Rhithrogena sp.</i>	2	2	1	2	7	0%	1.8	0.5
<i>Paraleptophlebia bicornuta</i>	4	5	59	29	97	3%	24.3	25.9
<i>Tricorythodes minutus</i>	85	224	314	202	825	25%	206.3	94.2
HEMIPTERA								
<i>Sigara sp.</i>	0	1	9	2	12	0%	3.0	4.1



B.24 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Harper Bridge - STATION 20 -4 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	674	977	719	974	3344		836	162
TAXA RICHNESS	45	42	38	38	58		40.8	3.4
SHAN. DIVERSITY	4.18	3.69	3.30	4.05	4.02		3.80	0.39
BIOTIC INDEX	4.68	4.35	4.26	4.56	4.46		4.46	0.19
EPT RICHNESS	23	21	19	15	26		19.5	3.4
% R.A. DOMINANT	20%	23%	44%	21%	25%		27%	11%
% R.A. FILTERERS	32%	24%	6%	17%	20%		20%	11%
METALS TOLERANCE	4.05	3.93	3.87	4.19	4.01		4.01	0.14
Baetidae/Ephemeroptera	0.18	0.04	0.02	0.10	0.07		0.08	0.07
Hydropsychinae/Trichoptera	0.78	0.81	0.71	0.82	0.80		0.78	0.05
EPT / (EPT + CHIR.)	0.76	0.83	0.75	0.70	0.76		0.76	0.06
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	5	4	3	3	5		3.8	1.0
# SAND TOLERANT TAXA	3	4	3	2	4		3.0	0.8
# FINE SED TOLERANT TAXA	10	8	10	8	13		9.0	1.2
% SAND TOLERANT	4%	3%	1%	3%	3%		3%	1%
% SEDIMENT TOLERANT	28%	38%	64%	35%	41%		41%	16%
SEDIMENT TOLERANT INDEX	6.00	5.90	6.24	6.02	6.03		6.04	0.14
FSBI	104	102	84	75	122		91.3	14.1

B.25 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Huson - STATION 22 -5 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						1%	11	
<i>Optioservus spp.</i>	9	7	13	10	39	1%	9.8	2.5
<i>Zaitzevia sp.</i>	0	1	0	2	3	0%	0.8	1.0
<i>Oreodytes spp.</i>	1	1	0	0	2	0%	0.5	0.6
DIPTERA						28%	296	
<i>Thienemannimyia gp.</i>	10	4	9	3	26	1%	6.5	3.5
<i>Nilotanyus sp.</i>	1	0	0	0	1	0%	0.3	0.5
<i>Potthastia spp.</i>	52	19	10	12	93	2%	23.3	19.6
<i>Cardiocladius spp.</i>	2	1	22	12	37	1%	9.3	9.8
<i>Cricotopus spp.</i>	74	25	63	105	267	6%	66.8	33.0
<i>Eukiefferiella spp.</i>	2	1	1	13	17	0%	4.3	5.9
<i>Nanocladius sp.</i>	1	2	0	0	3	0%	0.8	1.0
<i>Orthocladius spp.</i>	17	2	24	17	60	1%	15.0	9.3
<i>Tvetenia sp.</i>	11	4	14	11	40	1%	10.0	4.2
<i>Psuedochironomus sp.</i>	0	1	0	0	1	0%	0.3	0.5
<i>Cryptochironomus sp.</i>	1	0	0	1	2	0%	0.5	0.6
<i>Microtendipes sp</i>	16	45	35	9	105	2%	26.3	16.6
<i>Phaenopsectra sp</i>	9	3	2	0	14	0%	3.5	3.9
<i>Polypedilum spp.</i>	122	59	90	57	328	8%	82.0	30.6
<i>Cladotanytarsus sp.</i>	0	4	1	0	5	0%	1.3	1.9
<i>Rheotanytarsus sp.</i>	25	18	16	13	72	2%	18.0	5.1
<i>Micropectra spp.</i>	24	21	28	22	95	2%	23.8	3.1
<i>Antocha sp.</i>	0	1	0	3	4	0%	1.0	1.4
<i>Hexatoma sp.</i>	2	4	0	1	7	0%	1.8	1.7
<i>Atherix pachypus</i>	1	0	0	1	2	0%	0.5	0.6
<i>Simulium spp.</i>	1	0	0	3	4	0%	1.0	1.4
<i>Hemerodromia sp.</i>	0	0	1	0	1	0%	0.3	0.5
EPHEMEROPTERA						34%	354	
<i>Acentrella insignificans</i>	32	12	55	32	131	3%	32.8	17.6
<i>Baetis tricaudatus</i>	1	3	8	13	25	1%	6.3	5.4
<i>Dipheter hageni</i>	2	5	4	14	25	1%	6.3	5.3
<i>Attenella margarita</i>	89	60	57	27	233	6%	58.3	25.3
<i>Serratella tibialis</i>	0	0	0	1	1	0%	0.3	0.5
<i>Timpango hecuba</i>	1	0	0	0	1	0%	0.3	0.5
<i>Epeorus albertae</i>	3	0	0	2	5	0%	1.3	1.5
<i>Heptagenia sp.</i>	18	2	1	6	27	1%	6.8	7.8
<i>Nixe sp.</i>	21	15	15	8	59	1%	14.8	5.3
<i>Paraleptophlebia bicornuta</i>	44	48	19	14	125	3%	31.3	17.2
<i>Tricorythodes minutus</i>	319	181	185	99	784	19%	196.0	91.1

## B.25 MACROINVERTEBRATE DATA

CLARK FORK RIVER at Huson - STATION 22 -5 AUG 2001

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
HEMIPTERA								
<i>Sigara sp.</i>	0	1	0	0	1	0%	0.3	0.5
LEPIDOPTERA								
<i>Petrophila sp.</i>	75	43	40	20	178	4%	44.5	22.8
PLECOPTERA						1%	14	
<i>Claassenia sabulosa</i>	0	3	1	0	4	0%	1.0	1.4
<i>Hesperoperla pacifica</i>	0	0	0	1	1	0%	0.3	0.5
<i>Isogenoides sp.</i>	18	13	13	3	47	1%	11.8	6.3
<i>Skwala sp.</i>	1	1	2	0	4	0%	1.0	0.8
<i>Pteronarcys californica</i>	0	1	0	0	1	0%	0.3	0.5
TRICHOPTERA						31%	328	
<i>Arctopsyche grandis</i>	2	1	2	1	6	0%	1.5	0.6
<i>Cheumatopsyche spp.</i>	182	75	192	173	622	15%	155.5	54.2
<i>Hydropsyche occidentalis</i>	101	26	166	70	363	9%	90.8	58.9
<i>Hydropsyche (C) cockerelli</i>	2	8	11	10	31	1%	7.8	4.0
<i>Hydroptila spp.</i>	84	19	42	33	178	4%	44.5	28.0
<i>Leucotrichia pictipes</i>	0	0	0	2	2	0%	0.5	1.0
<i>Zumatrichia notosa</i>	0	0	1	0	1	0%	0.3	0.5
<i>Ceraclea sp.</i>	7	1	7	0	15	0%	3.8	3.8
<i>Oecetis sp.</i>	2	16	4	0	22	1%	5.5	7.2
<i>Psychomyia flavida</i>	15	7	1	4	27	1%	6.8	6.0
<i>Brachycentrus occidentalis</i>	15	3	6	5	29	1%	7.3	5.3
<i>Glossosoma sp.</i>	8	2	4	1	15	0%	3.8	3.1
ANNELIDA						0%	3	
Naididae	8	1	1	0	10	0%	2.5	3.7
Tubificidae	0	0	1	0	1	0%	0.3	0.5
CRUSTACEA								
<i>Hyalella azteca</i>	2	0	1	0	3	0%	0.8	1.0
MOLLUSCA						0%	3	
<i>Physella sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Ferrissia sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Gyraulus sp.</i>	1	4	2	1	8	0%	2.0	1.4

B.25 MACROINVERTEBRATE DATA								
CLARK FORK RIVER at Huson - STATION 22 -5 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	1434	774	1172	835	4215		1054	308
TAXA RICHNESS	46	46	44	41	61		44.3	2.4
SHAN. DIVERSITY	4.06	4.17	4.06	4.11	4.22		4.10	0.05
BIOTIC INDEX	4.57	4.51	4.81	5.01	4.71		4.72	0.23
EPT RICHNESS	22	22	22	21	28		21.8	0.5
% R.A. DOMINANT	22%	23%	16%	21%	19%		21%	3.1%
% R.A. FILTERERS	23%	17%	34%	33%	27%		27%	8%
METALS TOLERANCE	4.01	3.67	4.34	4.86	4.21		4.22	0.51
Baetidae/Ephemeroptera	0.07	0.06	0.19	0.27	0.13		0.15	0.10
Hydropsychinae/Trichoptera	0.68	0.69	0.85	0.85	0.77		0.77	0.09
EPT / (EPT + CHIR.)	0.72	0.71	0.72	0.65	0.70		0.70	0.03
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	4	4	3	5	6		4.0	0.8
# SAND TOLERANT TAXA	5	6	4	4	7		4.8	1.0
# FINE SED TOLERANT TAXA	11	11	10	8	14		10.0	1.4
% SAND TOLERANT	2%	4%	2%	2%	2%		2%	1%
% SEDIMENT TOLERANT	45%	45%	37%	38%	41%		41%	5%
SEDIMENT TOLERANT INDEX	6.27	6.25	6.20	6.45	6.28		6.29	0.11
FSBI	98	100	85	116	132		99.8	12.7

B.26 MACROINVERTEBRATE DATA								
CLARK FORK RIVER near Superior- STATION 24 -5 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						4%	43	
<i>Optioservus</i> spp.	14	5	13	19	51	1%	12.8	5.8
<i>Zaitzevia</i> sp.	2	2	11	106	121	3%	30.3	50.7
DIPTERA						17%	196	
<i>Thienemannimyia</i> gp.	3	0	0	4	7	0%	1.8	2.1
<i>Potthastia</i> spp.	0	0	0	1	1	0%	0.3	0.5
<i>Cardiocladius</i> spp.	1	0	0	0	1	0%	0.3	0.5
<i>Cricotopus</i> spp.	30	2	3	32	67	1%	16.8	16.5
<i>Eukiefferiella</i> spp.	7	11	0	3	21	0%	5.3	4.8
<i>Orthocladius</i> spp.	6	1	1	39	47	1%	11.8	18.3
<i>Tvetenia</i> sp.	37	40	20	96	193	4%	48.3	33.0
<i>Microtendipes</i> sp	2	0	0	2	4	0%	1.0	1.2
<i>Polypedilum</i> spp.	40	24	19	104	187	4%	46.8	39.2
<i>Rheotanytarsus</i> sp.	3	0	6	11	20	0%	5.0	4.7
<i>Micropsectra</i> spp.	68	26	8	113	215	5%	53.8	46.8
<i>Antocha</i> sp.	1	0	1	1	3	0%	0.8	0.5
<i>Hexatoma</i> sp.	0	0	1	0	1	0%	0.3	0.5
<i>Simulium</i> spp.	11	2	1	3	17	0%	4.3	4.6
EPHEMEROPTERA						7%	78	
<i>Acentrella insignificans</i>	4	1	1	6	12	0%	3.0	2.4
<i>Baetis tricaudatus</i>	21	23	13	36	93	2%	23.3	9.5
<i>Dipheter hageni</i>	0	3	1	4	8	0%	2.0	1.8
<i>Attenella margarita</i>	2	1	7	6	16	0%	4.0	2.9
<i>Serratella tibialis</i>	21	48	32	20	121	3%	30.3	13.0
<i>Ephemerella inermis</i>	1	1	0	1	3	0%	0.8	0.5
<i>Drunella grandis</i>	4	4	4	4	16	0%	4.0	0.0
<i>Epeorus albertae</i>	11	3	11	6	31	1%	7.8	3.9
<i>Rhithrogena</i> sp.	4	2	2	0	8	0%	2.0	1.6
<i>Paraleptophlebia</i> sp.	2	0	0	0	2	0%	0.5	1.0
<i>Tricorythodes minutus</i>	0	0	0	1	1	0%	0.3	0.5
LEPIDOPTERA								
<i>Petrophila</i> sp.	0	0	2	0	2	0%	0.5	1.0
PLECOPTERA						2%	28	
<i>Claassenia sabulosa</i>	2	1	4	2	9	0%	2.3	1.3
<i>Hesperoperla pacifica</i>	0	1	0	2	3	0%	0.8	1.0
<i>Isonychia</i> sp.	17	43	15	25	100	2%	25.0	12.8

B.26 MACROINVERTEBRATE DATA								
CLARK FORK RIVER near Superior- STATION 24 -5 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TRICHOPTERA						70%	821	
<i>Arctopsyche grandis</i>	5	4	5	3	17	0%	4.3	1.0
<i>Cheumatopsyche</i> spp.	204	419	245	412	1280	27%	320.0	111.6
<i>Hydropsyche occidentalis</i>	148	261	80	404	893	19%	223.3	141.7
<i>Hydropsyche (C) cockerelli</i>	71	82	77	244	474	10%	118.5	83.8
<i>Hydropsyche osleri</i> ?	18	15	3	10	46	1%	11.5	6.6
<i>Hydroptila</i> spp.	49	76	9	11	145	3%	36.3	32.3
<i>Oecetis</i> sp.	1	0	1	6	8	0%	2.0	2.7
<i>Brachycentrus occidentalis</i>	4	2	15	12	33	1%	8.3	6.2
<i>Protophila</i> sp.	1	0	9	24	34	1%	8.5	11.1
<i>Glossosoma</i> sp.	55	56	86	158	355	8%	88.8	48.4
ANNELIDA						1%	6	
Lumbricidae	4	8	5	1	18	0%	4.5	2.9
Lumbriculidae	1	0	0	4	5	0%	1.3	1.9
Tubificidae	0	0	0	1	1	0%	0.3	0.5
Erpobdellidae	1	0	0	0	1	0%	0.3	0.5
MOLLUSCA						0%	1	
<i>Physella</i> sp.	0	0	0	1	1	0%	0.3	0.5
<i>Fossaria</i> sp.	1	0	0	0	1	0%	0.3	0.5
OTHER								
Turbellaria	1	0	1	0	2	0%	0.5	0.6
ID's by D. McGuire								
TOTAL ORGANISMS	878	1167	712	1938	4695		1174	543
TAXA RICHNESS	40	30	34	40	48		36.0	4.9
SHAN. DIVERSITY	3.86	3.09	3.48	3.60	3.65		3.51	0.32
BIOTIC INDEX	4.44	4.49	3.86	4.30	4.31		4.27	0.28
EPT RICHNESS	21	20	20	22	24		20.8	1.0
% R.A. DOMINANT	23%	36%	34%	21%	27%		29%	7.5%
% R.A. FILTERERS	53%	67%	61%	57%	59%		59%	6%
METALS TOLERANCE	4.18	4.32	3.91	4.15	4.16		4.14	0.17
Baetidae/Ephemeroptera	0.36	0.31	0.21	0.55	0.36		0.36	0.14
Hydropsychinae/Trichoptera	0.79	0.85	0.76	0.83	0.82		0.81	0.04
EPT / (EPT + CHIR.)	0.77	0.91	0.92	0.78	0.83		0.84	0.08
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	6	6	6	6	7		6.0	0.0
# SAND TOLERANT TAXA	4	2	5	4	5		3.8	1.3
# FINE SED TOLERANT TAXA	4	1	1	5	8		2.8	2.1
% SAND TOLERANT	2%	1%	4%	7%	4%		3%	3%
% SEDIMENT TOLERANT	24%	36%	34%	21%	27%		29%	7%
SEDIMENT TOLERANT INDEX	6.06	6.24	6.08	5.96	6.07		6.09	0.12
FSBI	107	110	108	114	125		109.8	3.1

B.27 MACROINVERTEBRATE DATA								
CLARK FORK RIVER above Flathead River - STATION 25 -5 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						0%	5	
<i>Optioservus</i> spp.	5	3	2	1	11	0%	2.8	1.7
<i>Zaitzevia</i> sp.	1	5	2	2	10	0%	2.5	1.7
DIPTERA						42%	459	
<i>Thienemannimyia</i> gp.	12	5	7	6	30	1%	7.5	3.1
<i>Pagastia</i> sp	2	0	1	0	3	0%	0.8	1.0
<i>Cardiocladius</i> spp.	0	0	1	0	1	0%	0.3	0.5
<i>Cricotopus</i> spp.	10	9	41	7	67	2%	16.8	16.2
<i>Eukiefferiella</i> spp.	1	1	0	0	2	0%	0.5	0.6
<i>Nanocladius</i> sp.	0	0	0	1	1	0%	0.3	0.5
<i>Orthocladius</i> spp.	8	0	3	2	13	0%	3.3	3.4
<i>Tvetenia</i> sp.	38	39	36	10	123	3%	30.8	13.9
<i>Microtendipes</i> sp	5	14	14	11	44	1%	11.0	4.2
<i>Polypedilum</i> spp.	33	9	20	10	72	2%	18.0	11.2
<i>Xenochironomus</i> sp.	0	0	1	0	1	0%	0.3	0.5
<i>Cladotanytarsus</i> sp.	0	0	0	1	1	0%	0.3	0.5
<i>Rheotanytarsus</i> sp.	421	308	348	189	1266	29%	316.5	97.0
<i>Tanytarsus</i> sp.	0	0	2	0	2	0%	0.5	1.0
<i>Microspectra</i> spp.	73	29	63	40	205	5%	51.3	20.3
<i>Antocha</i> sp.	5	0	0	0	5	0%	1.3	2.5
<i>Simulium</i> spp.	0	0	1	0	1	0%	0.3	0.5
EPHEMEROPTERA						8%	92	
<i>Acentrella insignificans</i>	21	8	6	2	37	1%	9.3	8.2
<i>Baetis tricaudatus</i>	3	2	2	1	8	0%	2.0	0.8
<i>Attenella margarita</i>	4	10	13	7	34	1%	8.5	3.9
<i>Serratella tibialis</i>	0	12	3	1	16	0%	4.0	5.5
<i>Ephemerella inermis</i>	0	1	1	0	2	0%	0.5	0.6
<i>Drunella grandis</i>	8	2	2	2	14	0%	3.5	3.0
<i>Timpano hecuba</i>	0	0	6	6	12	0%	3.0	3.5
<i>Heptagenia</i> sp.	46	23	25	27	121	3%	30.3	10.6
<i>Nixe</i> sp.	1	0	1	3	5	0%	1.3	1.3
<i>Rhithrogena</i> sp.	0	1	0	0	1	0%	0.3	0.5
<i>Paraleptophlebia bicomuta</i>	2	19	51	41	113	3%	28.3	22.0
<i>Tricorythodes minutus</i>	1	0	3	1	5	0%	1.3	1.3
LEPIDOPTERA								
<i>Petrophila</i> sp.	96	115	96	89	396	9%	99.0	11.2
PLECOPTERA						0%	5	
<i>Claassenia sabulosa</i>	0	1	0	0	1	0%	0.3	0.5
<i>Isogenoides</i> sp.	1	12	2	1	16	0%	4.0	5.4
<i>Skwala</i> sp.	0	0	2	0	2	0%	0.5	1.0

B.27 MACROINVERTEBRATE DATA									
CLARK FORK RIVER above Flathead River - STATION 25 -5 AUG 2001									
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.	
TRICHOPTERA						38%	413		
<i>Arctopsyche grandis</i>	1	2	3	2	8	0%	2.0	0.8	
<i>Cheumatopsyche</i> spp.	249	402	238	197	1086	25%	271.5	89.8	
<i>Hydropsyche occidentalis</i>	30	49	14	2	95	2%	23.8	20.4	
<i>Hydropsyche (C) cockerelli</i>	60	84	64	26	234	5%	58.5	24.1	
<i>Hydroptila</i> spp.	29	31	35	16	111	3%	27.8	8.2	
<i>Ceraclea</i> sp.	10	0	0	6	16	0%	4.0	4.9	
<i>Oecetis</i> sp.	0	0	3	0	3	0%	0.8	1.5	
<i>Psychomyia flavida</i>	26	21	20	13	80	2%	20.0	5.4	
<i>Brachycentrus occidentalis</i>	5	5	7	3	20	0%	5.0	1.6	
ANNELIDA						1%	8		
Lumbricidae	3	17	5	6	31	1%	7.8	6.3	
MOLLUSCA						0%	1		
<i>Physella</i> sp.	1	0	0	1	2	0%	0.5	0.6	
<i>Ferrissia</i> sp.	0	0	1	0	1	0%	0.3	0.5	
OTHER									
Turbellaria	3	2	1	2	8	0%	2.0	0.8	
Porifera	1	1	1	0	3	0%	0.8	0.5	
ID's by D. McGuire									
TOTAL ORGANISMS	1215	1242	1147	735	4339		1085	237	
TAXA RICHNESS	35	32	41	35	49		35.8	3.8	
SHAN. DIVERSITY	3.30	3.22	3.50	3.36	3.43		3.34	0.12	
BIOTIC INDEX	5.11	4.98	5.01	4.86	5.00		4.99	0.10	
EPT RICHNESS	17	18	21	19	24		18.8	1.7	
% R.A. DOMINANT	35%	32%	30%	27%	29%		31%	3.3%	
% R.A. FILTERERS	63%	68%	59%	57%	62%		62%	5%	
METALS TOLERANCE	2.74	3.26	2.98	2.86	2.97		2.96	0.22	
Baetidae/Ephemeroptera	0.28	0.13	0.07	0.03	0.12		0.13	0.11	
Hydropsychinae/Trichoptera	0.83	0.90	0.82	0.85	0.86		0.85	0.04	
EPT / (EPT + CHIR.)	0.45	0.62	0.48	0.56	0.53		0.53	0.08	
Experimental Sediment Metrics									
# SED INTOLERANT TAXA	2	3	2	2	3		2.3	0.5	
# SAND TOLERANT TAXA	4	2	3	3	5		3.0	0.8	
# FINE SED TOLERANT TAXA	6	3	5	7	7		5.3	1.7	
% SAND TOLERANT	2%	1%	1%	1%	1%		1%	1%	
% SEDIMENT TOLERANT	25%	36%	28%	37%	31%		31%	6%	
SEDIMENT TOLERANT INDEX	6.40	6.54	6.36	6.53	6.45		6.46	0.09	
FSBI	83	86	94	82	106		86.3	5.4	

B.28 MACROINVERTEBRATE DATA								
CLARK FORK RIVER above Thompson Falls Res - STATION 27 -5 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						1%	3	
<i>Optioservus spp.</i>	4	1	1	0	6	0%	1.5	1.7
<i>Zaitzevia sp.</i>	0	3	0	2	5	0%	1.3	1.5
<i>Oreodytes spp.</i>	1	0	1	0	2	0%	0.5	0.6
DIPTERA						8%	36	
<i>Cricotopus spp.</i>	2	2	1	0	5	0%	1.3	1.0
<i>Nanocladius sp.</i>	0	0	1	0	1	0%	0.3	0.5
<i>Orthocladius spp.</i>	0	1	0	1	2	0%	0.5	0.6
<i>Synorthocladius sp.</i>	0	2	0	1	3	0%	0.8	1.0
<i>Tvetenia sp.</i>	1	18	7	4	30	2%	7.5	7.4
<i>Microtendipes sp</i>	3	10	22	9	44	3%	11.0	8.0
<i>Polypedilum spp.</i>	3	5	1	1	10	1%	2.5	1.9
<i>Xenochironomus sp.</i>	0	0	0	1	1	0%	0.3	0.5
<i>Cladotanytarsus sp.</i>	0	0	0	2	2	0%	0.5	1.0
<i>Rheotanytarsus sp.</i>	13	9	8	8	38	2%	9.5	2.4
<i>Microspectra spp.</i>	0	1	1	0	2	0%	0.5	0.6
<i>Simulium spp.</i>	2	1	0	1	4	0%	1.0	0.8
EPHEMEROPTERA						11%	48	
<i>Acentrella insignificans</i>	5	5	2	4	16	1%	4.0	1.4
<i>Baetis tricaudatus</i>	0	0	0	1	1	0%	0.3	0.5
<i>Attenella margarita</i>	1	1	0	1	3	0%	0.8	0.5
<i>Drunella grandis</i>	0	0	1	1	2	0%	0.5	0.6
<i>Epeorus albertae</i>	1	1	1	0	3	0%	0.8	0.5
<i>Heptagenia sp.</i>	7	9	118	7	141	8%	35.3	55.2
<i>Nixe sp.</i>	1	0	0	0	1	0%	0.3	0.5
<i>Stenonema sp.</i>	4	6	5	3	18	1%	4.5	1.3
<i>Paraleptophlebia bicornuta</i>	0	0	0	1	1	0%	0.3	0.5
<i>Tricorythodes minutus</i>	1	2	1	1	5	0%	1.3	0.5
LEPIDOPTERA								
<i>Petrophila sp.</i>	21	23	18	37	99	6%	24.8	8.4
ODONATA								
<i>Ophiogomphus sp.</i>	0	0	1	0	1	0%	0.3	0.5
PLECOPTERA						0%	2	
<i>Claassenia sabulosa</i>	1	0	2	0	3	0%	0.8	1.0
<i>Isogenoides sp.</i>	1	0	1	0	2	0%	0.5	0.6
<i>Skwala sp.</i>	0	0	1	0	1	0%	0.3	0.5

B.28 MACROINVERTEBRATE DATA								
CLARK FORK RIVER above Thompson Falls Res - STATION 27 -5 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TRICHOPTERA						59%	253	
<i>Cheumatopsyche</i> spp.	202	133	245	113	693	40%	173.3	61.2
<i>Hydropsyche occidentalis</i>	8	2	0	5	15	1%	3.8	3.5
<i>Hydropsyche</i> (C) <i>cockerelli</i>	33	48	32	28	141	8%	35.3	8.8
<i>Hydropsyche</i> <i>oslari</i> ?	0	0	0	1	1	0%	0.3	0.5
<i>Dicosmoecus</i> sp.	0	1	1	1	3	0%	0.8	0.5
<i>Hydroptila</i> spp.	0	5	4	1	10	1%	2.5	2.4
<i>Ceraclea</i> sp.	6	6	4	6	22	1%	5.5	1.0
<i>Psychomyia flavida</i>	1	1	1	2	5	0%	1.3	0.5
<i>Brachycentrus occidentalis</i>	0	0	0	1	1	0%	0.3	0.5
<i>Neureclipsis</i> sp.	1	0	0	0	1	0%	0.3	0.5
<i>Polycentropus</i> sp.	0	0	0	1	1	0%	0.3	0.5
<i>Protoptila</i> sp.	2	10	9	6	27	2%	6.8	3.6
<i>Glossosoma</i> sp.	22	33	29	9	93	5%	23.3	10.5
ANNELIDA						0%	1	
<i>Lumbriculidae</i>	2	0	1	0	3	0%	0.8	1.0
MOLLUSCA						15%	63	
<i>Physella</i> sp.	0	0	1	4	5	0%	1.3	1.9
<i>Ferrissia</i> sp.	0	5	1	1	7	0%	1.8	2.2
<i>Gyraulus</i> sp.	4	2	5	3	14	1%	3.5	1.3
<i>Fossaria</i> sp.	50	22	101	27	200	12%	50.0	36.1
<i>Fisherola nutalli</i>	6	15	1	3	25	1%	6.3	6.2
OTHER								
<i>Turbellaria</i>	1	0	0	0	1	0%	0.3	0.5
<i>Porifera</i>	0	1	0	1	2	0%	0.5	0.6
ID's by D. McGuire								

B.28 MACROINVERTEBRATE DATA								
CLARK FORK RIVER above Thompson Falls Res - STATION 27 -5 AUG 2001								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	410	384	629	299	1722		431	141
TAXA RICHNESS	31	32	34	37	51		33.5	2.6
SHAN. DIVERSITY	2.92	3.57	2.91	3.49	3.35		3.22	0.36
BIOTIC INDEX	4.71	4.28	4.66	4.70	4.59		4.59	0.20
EPT RICHNESS	17	15	17	20	26		17.3	2.1
% R.A. DOMINANT	49%	35%	39%	38%	40%		40%	6.3%
% R.A. FILTERERS	63%	50%	45%	53%	52%		53%	7%
METALS TOLERANCE	3.82	3.54	3.24	3.62	3.51		3.55	0.24
Baetidae/Ephemeroptera	0.25	0.21	0.02	0.26	0.09		0.18	0.11
Hydropsychinae/Trichoptera	0.88	0.77	0.86	0.85	0.84		0.84	0.05
EPT / (EPT + CHIR.)	0.93	0.85	0.92	0.88	0.90		0.89	0.04
Experimental Sediment Metrics								
# SED INTOLERANT TAXA	4	4	4	3	4		3.8	0.5
# SAND TOLERANT TAXA	2	3	2	2	3		2.3	0.5
# FINE SED TOLERANT TAXA	8	5	9	8	13		7.5	1.7
% SAND TOLERANT	2%	3%	1%	3%	2%		2%	1%
% SEDIMENT TOLERANT	65%	44%	75%	53%	62%		59%	14%
SEDIMENT TOLERANT INDEX	7.06	6.46	7.38	6.80	7.00		6.92	0.39
FSBI	51	65	57	84	100		64.3	14.4

## **APPENDIX C:**

Metric values and bioassessment scores for Clark Fork Basin  
monitoring stations, 1986-2001

**C-1. Mean metric values and bioassessment scores for Blacktail Creek above Grove Gulch:  
Station SF-1, August, 1993-2001 (4 Hess samples per year).**

	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>										
Taxa richness	30	35	31	27	23	29	31	35	33	30
Shannon diversity	1.9	3.3	3.0	3.0	3.0	3.3	3.3	3.6	3.6	3.1
EPT/EPTC	0.20	0.76	0.54	0.87	0.75	0.86	0.73	0.62	0.42	0.64
Hydropsychinae/Trichoptera	0.58	0.97	1.00	0.99	0.99	0.96	0.89	0.82	0.62	0.87
Baetidae/Ephemeroptera	0.40	0.92	0.90	0.94	0.96	0.89	0.88	0.71	0.60	0.80
Biotic index	6.3	4.3	4.1	4.1	4.5	4.2	4.5	3.9	3.8	4.4
% Filterer	67	47	57	65	66	55	49	15	26	50
Density	1648	1670	2566	1147	1173	921	1176	1434	843	1398
EPT richness	10	13	10	12	9	13	12	13	12	11
Metals Tolerance index	6.6	6.0	5.5	6.0	6.0	5.5	5.5	5.1	5.3	5.7
<b>Metric scores</b>										
Taxa richness	4	5	4	3	2	3	4	5	4	4
Shannon diversity	2	5	5	5	5	5	5	6	6	5
EPT/EPTC	2	6	5	6	6	6	6	6	4	5
Hydropsychinae/Trichoptera	6	1	0	1	1	2	4	6	6	3
Baetidae/Ephemeroptera	6	3	4	2	2	4	4	6	6	4
Biotic index	2	5	5	5	5	5	5	6	6	5
% Filterer	2	6	4	3	2	5	6	6	6	4
Density (high)	6	6	5	6	6	6	6	6	6	6
Density (low)	6	6	6	6	6	6	6	6	6	6
EPT richness	3	3	3	3	2	3	3	3	3	3
Metals Tolerance index	3	3	4	3	3	4	4	4	4	4
Total	42	49	45	43	40	49	53	60	57	49
Organic subset	10	17	14	14	13	16	17	18	18	15
Metals subset	12	12	13	12	11	13	13	13	13	12
<b>Bioassessment</b>										
Overall	64%	74%	68%	65%	61%	74%	80%	91%	86%	74%
Organic subset	56%	94%	78%	78%	72%	89%	94%	100%	100%	85%
Metals subset	67%	67%	72%	67%	61%	72%	72%	72%	72%	69%

**C-2. Mean metric values and bioassessment scores for Silver Bow Creek above the Butte WWTP:**

**Station 00 - August, 1987-2001 (four Hess samples per year).**

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																
Taxa richness	5	6	6	7	9	10	8	14	10	12	17	16	17	26	25	12
Shannon diversity	1.6	2.3	0.9	1.4	1.8	1.4	1.7	1.7	1.8	2.1	2.7	2.1	1.7	2.3	2.4	1.8
EPT/EPTC	0.03	0.03	0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.14	0.35	0.06	0.13	0.14	0.05	0.07
Hydropsychinae/Trichoptera	1.00	0.75	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.99	1.00	0.96	0.72	0.59	0.93
Baetidae/Ephemeroptera	1.00	1.00	1.00	1.00	0.75	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00	1.00	0.98
Biotic index	4.9	5.1	6.6	5.7	4.9	6.3	5.0	5.7	5.4	5.2	4.5	5.6	6.3	6.1	6.5	5.6
% Filterer	0	2	1	0	0	0	1	2	1	13	34	19	22	12	32	9
Density	26	46	175	362	344	167	247	607	278	367	378	349	682	707	1274	401
EPT richness	0	1	0	1	1	1	1	2	1	3	6	5	5	7	4	2
Metals Tolerance index	9.3	9.2	9.7	9.4	9.2	9.3	9.4	9.4	9.1	8.9	8.0	8.4	8.9	8.2	8.0	9.0
<b>Metric scores</b>																
Taxa richness	0	0	0	0	0	0	0	0	0	0	1	1	1	3	3	1
Shannon diversity	1	3	0	0	2	0	1	1	2	2	4	2	1	3	3	2
EPT/EPTC	0	0	0	0	0	0	0	0	0	1	4	1	1	1	1	1
Hydropsychinae/Trichoptera	0	6	0	0	0	0	0	0	2	0	1	0	2	6	6	2
Baetidae/Ephemeroptera	0	0	0	0	6	0	0	0	0	0	2	0	0	0	0	1
Biotic index	4	4	1	3	4	2	4	3	3	3	5	3	2	2	1	3
% Filterer	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Density (high)	*	*	*	*	*	*	*	6	*	*	*	*	6	6	6	6
Density (low)	0	0	2	4	3	2	2	6	3	4	4	3	6	6	6	3
EPT richness	0	0	0	0	0	0	0	1	0	1	2	1	1	2	1	1
Metals Tolerance index	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0
Total	11	19	9	13	21	10	13	23	16	18	28	20	27	36	34	20
Organic subset	10	10	7	9	10	8	10	15	9	9	11	9	14	14	13	11
Metals subset	0	0	2	4	3	2	2	7	3	6	7	5	8	9	8	4
<b>Bioassessment</b>																
Overall	18%	32%	15%	22%	35%	17%	22%	35%	27%	30%	47%	33%	41%	55%	52%	32%
Organic subset	83%	83%	58%	75%	83%	67%	83%	83%	75%	75%	92%	75%	78%	78%	72%	77%
Metals subset	0%	0%	11%	22%	17%	11%	11%	39%	17%	33%	39%	28%	44%	50%	44%	24%

\* not calculated if density is < 550

**C-3. Mean metric values and bioassessment scores for Silver Bow Creek below Butte WWTP:**

**Station 01 - August, 1986-20010 (four Hess samples per year).**

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																	
Taxa richness	7	6	11	5	7	11	11	11	8	11	9	7	10	12	12	17	10
Shannon diversity	1.1	1.7	1.5	1.0	1.2	2.1	2.0	1.2	0.7	1.9	1.1	1.4	1.2	1.5	1.4	1.0	1.4
EPT/EPTC	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Hydropsychinae/Trichoptera	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.00
Baetidae/Ephemeroptera	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Biotic index	6.9	6.3	6.0	6.9	6.8	6.5	7.4	6.9	7.1	6.0	6.9	6.5	7.0	8.1	7.1	7.0	6.8
% Filterer	55	3	59	73	69	28	51	77	87	2	57	11	71	40	72	84	52
Density	628	118	1450	361	1763	473	315	2663	882	426	1588	306	965	1433	738	2270	1024
EPT richness	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Metals Tolerance index	8.3	9.3	7.8	7.7	7.8	8.9	7.8	7.5	7.2	8.9	8.3	9.4	7.7	6.9	7.2	7.1	8.0
<b>Metric scores</b>																	
Taxa richness	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Shannon diversity	0	1	1	0	0	2	2	0	0	2	0	1	0	1	1	0	1
EPT/EPTC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydropsychinae/Trichoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Baetidae/Ephemeroptera	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Biotic index	1	2	2	1	1	1	0	1	0	2	1	1	0	0	0	0	1
% Filterer	5	6	4	1	2	6	5	0	0	6	4	6	1	6	1	0	3
Density (high)	6	*	6	*	6	*	*	4	6	*	6	*	6	6	6	5	6
Density (low)	6	1	6	4	6	5	3	6	6	4	6	3	6	6	6	6	5
EPT richness	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metals Tolerance index	1	0	2	2	2	1	2	2	2	1	1	0	2	3	2	2	2
<b>Total</b>																	
Total	25	10	21	8	17	15	12	13	14	15	18	11	15	22	16	16	18
Organic subset	12	8	12	2	9	7	5	5	6	8	11	7	7	12	7	5	10
Metals subset	7	1	8	6	8	6	5	8	8	5	7	3	8	9	8	8	7
<b>Bioassessment</b>																	
Overall	38%	17%	32%	13%	26%	25%	20%	20%	21%	25%	27%	18%	23%	33%	24%	24%	24%
Organic subset	67%	67%	67%	17%	50%	58%	42%	28%	33%	67%	61%	58%	39%	67%	39%	28%	49%
Metals subset	39%	6%	44%	33%	44%	33%	28%	44%	44%	28%	39%	17%	44%	50%	44%	44%	36%

\* not calculated if density is < 550

**C-4. Mean metric values and bioassessment scores for Silver Bow Creek near Opportunity:**

**Station 02.5\* - August 1986-2001 (four Hess samples per year).**

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																	
Taxa richness	9	11	14	11	8	11	16	13	14	10	19	5	10	10	13	15	12
Shannon diversity	2.1	2.3	2.1	2.6	2.2	2.3	2.9	1.7	2.3	2.2	2.4	1.2	2.0	2.4	2.4	2.0	2.2
EPT/EPTC	0.63	0.27	0.74	0.44	0.52	0.51	0.75	0.11	0.65	0.18	0.66	0.21	0.26	0.46	0.56	0.59	0.47
Hydropsychinae/Trichoptera	0.98	0.87	0.98	0.86	0.89	0.89	0.98	0.93	0.16	0.66	0.99	0.49	0.34	0.53	0.24	0.91	0.73
Baetidae/Ephemeroptera	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.75	0.97
Biotic index	4.0	4.9	5.4	3.8	4.3	4.7	4.6	4.3	4.1	4.5	3.6	4.3	4.3	3.2	3.5	3.0	4.2
% Filterer	53	21	73	39	51	51	71	12	77	18	62	21	25	45	67	59	47
Density	82	120	378	189	147	220	396	399	640	157	321	176	158	115	431	341	267
EPT richness	3	3	5	5	3	4	7	4	5	3	8	3	4	3	4	5	4
Metals Tolerance index	7.0	8.0	6.7	7.5	7.4	7.5	6.0	8.6	6.2	8.3	6.8	8.1	7.8	7.1	6.5	7.0	7.3
<b>Metric scores</b>																	
Taxa richness	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0
Shannon diversity	2	3	2	4	3	3	4	1	3	3	3	0	2	3	3	2	3
EPT/EPTC	6	3	6	4	5	5	6	1	6	2	6	2	3	5	6	6	5
Hydropsychinae/Trichoptera	1	5	1	5	4	4	1	3	6	6	1	6	6	6	6	3	4
Baetidae/Ephemeroptera	0	0	0	0	0	0	0	6	0	0	2	0	0	0	0	6	1
Biotic index	5	4	3	6	5	4	4	5	5	5	6	5	5	6	6	6	5
% Filterer	5	6	1	6	5	5	1	6	0	6	3	6	6	6	2	4	4
Density (high)	*	*	*	*	*	*	*	*	6	*	*	*	*	*	*	*	6
Density (low)	1	1	4	2	1	2	4	6	2	3	2	2	1	4	3	3	3
EPT richness	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	1	1
Metals Tolerance index	2	1	3	2	2	2	3	1	3	1	3	1	2	2	3	2	2
Total	23	24	21	30	26	26	26	28	36	26	30	23	27	30	31	34	28
Organic subset	10	10	4	12	10	9	5	11	11	11	9	11	11	12	8	10	10
Metals subset	4	3	8	5	4	5	9	6	10	4	8	4	5	4	8	6	6
<b>Bioassessment</b>																	
Overall	38%	40%	35%	50%	43%	43%	43%	47%	55%	43%	50%	38%	45%	50%	52%	57%	46%
Organic subset	83%	83%	33%	100%	83%	75%	42%	92%	61%	92%	75%	92%	92%	100%	67%	83%	78%
Metals subset	22%	17%	44%	28%	22%	28%	50%	33%	56%	22%	44%	22%	28%	22%	44%	33%	32%

**1986- 1992 data from Station 03.**

\* not calculated if density is < 550

**C-5. Mean metric values and bioassessment scores for Silver Bow Creek below Warm Springs Ponds:  
Station 04.5\* - August, 1986-2001 (4 samples per year).**

	1986	1987	1988	1989	1990	1991	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																
Taxa richness	16	16	18	16	13	16	29	30	27	30	33	35	36	42	42	27
Shannon diversity	2.4	1.6	2.5	2.7	2.1	1.9	3.0	3.2	2.9	2.5	2.0	2.4	3.6	3.6	3.4	2.7
EPT/EPTC	0.96	0.98	0.97	0.92	0.99	1.00	0.93	0.88	0.74	0.88	0.87	0.93	0.70	0.70	0.85	0.89
Hydropsychinae/Trichoptera	1.00	1.00	1.00	0.97	1.00	1.00	0.87	0.85	0.90	0.94	0.98	0.98	0.88	0.87	0.71	0.93
Baetidae/Ephemeroptera	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.90	0.80	0.26	0.23	0.52	0.65	0.82
Biotic index	6.3	5.1	5.8	5.9	5.0	5.1	5.5	4.8	5.4	5.1	5.2	5.2	5.5	5.4	5.4	5.4
% Filterer	66	94	75	79	93	90	32	51	58	75	79	80	27	44	29	65
Density	2558	1648	2563	2574	3223	1952	940	3018	3609	3090	3517	3345	2065	2983	3083	2678
EPT richness	4	5	4	6	6	5	8	12	8	13	13	13	12	19	15	9
Metals Tolerance index	5.1	5.4	5.1	5.8	5.4	5.8	4.6	5.4	6.1	5.2	5.3	5.1	4.6	4.5	4.3	5.2
<b>Metric scores</b>																
Taxa richness	1	1	1	1	0	1	3	4	3	4	4	5	5	6	6	3
Shannon diversity	3	1	3	4	2	2	5	5	4	3	2	3	6	6	6	4
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	0	0	0	1	0	0	5	5	4	2	1	1	4	5	6	2
Baetidae/Ephemeroptera	0	0	0	0	0	0	0	0	1	4	6	6	6	6	6	2
Biotic index	2	4	2	2	4	4	3	4	3	4	3	3	3	3	3	3
% Filterer	2	0	1	0	0	0	6	5	4	1	0	0	6	6	6	2
Density (high)	5	6	5	5	3	6	6	4	3	4	3	5	4	4	4	4
Density (low)	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
EPT richness	1	1	1	2	2	1	2	3	2	3	3	3	3	5	4	2
Metals Tolerance index	4	4	4	4	4	4	5	4	3	4	4	4	5	5	5	4
<b>Bioassessment</b>																
Overall	45%	44%	44%	47%	41%	45%	71%	70%	59%	62%	58%	61%	83%	88%	88%	60%
Organic subset	50%	56%	44%	39%	39%	56%	83%	72%	56%	50%	33%	33%	78%	72%	72%	56%
Metals subset	61%	61%	61%	67%	67%	61%	72%	72%	61%	72%	72%	72%	78%	89%	83%	70%

\* 1986-91 data from station 04.

**C-6. Mean metric values and bioassessment scores for the Mill-Willow Bypass  
Station MW-2\* - August, 1986-1991 and 1999-2001 (4 samples per year).**

	1986	1987	1988	1989	1990	1991	1999	2000	2001	Mean
<b>Metric values</b>										
Taxa richness	25	21	22	23		17	37	42	46	29
Shannon diversity	3.2	2.9	3.0	2.9		2.4	3.4	3.6	3.4	3.1
EPT/EPTC	0.86	0.97	0.91	0.86		0.80	0.82	0.70	0.85	0.85
Hydropsychinae/Trichoptera	0.96	0.88	0.85	0.92		0.98	0.20	0.19	0.38	0.67
Baetidae/Ephemeroptera	0.98	1.00	1.00	0.96		0.97	0.33	0.61	0.27	0.77
Biotic index	4.6	4.7	4.3	5.2		5.6	3.8	4.8	4.8	4.7
% Filterer	63	74	63	72		67	13	11	27	49
Density	357	822	869	1376		408	762	1397	3124	1139
EPT richness	11	10	8	10		7	22	20	21	14
Metals Tolerance index	5.2	5.1	5.3	5.6		6.8	4.1	4.1	4.6	5.1
<b>Metric scores</b>										
Taxa richness	3	2	2	2		1	5	6	6	3
Shannon diversity	5	4	5	4		3	6	6	6	5
EPT/EPTC	6	6	6	6		6	6	6	6	6
Hydropsychinae/Trichoptera	2	4	5	3		1	6	6	6	4
Baetidae/Ephemeroptera	1	0	0	2		1	6	6	6	3
Biotic index	4	4	5	3		3	6	4	4	4
% Filterer	3	1	3	1		2	6	6	6	4
Density (high)	*	6	6	6		*	6	6	4	6
Density (low)	4	6	6	6		4	6	6	6	6
EPT richness	3	3	2	3		2	6	5	5	4
Metals Tolerance index	4	4	4	4		3	5	5	5	4
Total	35	40	44	40		26	64	62	60	46
Organic subset	7	11	14	10		5	18	16	14	12
Metals subset	11	13	12	13		9	17	16	16	13
<b>Bioassessment</b>										
Overall	58%	61%	67%	61%		43%	97%	94%	91%	71%
Organic subset	58%	61%	78%	56%		42%	100%	89%	78%	70%
Metals subset	61%	72%	67%	72%		50%	94%	89%	89%	74%

\* 1986-1991 data from station 5; 1999-2001 data from reconstructed channel.

C-7. Mean metric values and bioassessment scores for Warm Springs Creek near mouth:

Station 06 - August, 1986-2001 (4 Hess samples per year).

	1986	1987	1988	1989	1990	1991	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																
Taxa richness	17	24	26	27	29	30	30	32	30	34	31	35	38	41	41	31
Shannon diversity	3.3	3.6	3.8	3.5	3.6	3.5	3.1	3.8	3.5	3.9	3.8	3.7	3.9	3.4	3.7	3.6
EPT/EPTC	0.91	0.66	0.78	0.75	0.60	0.85	0.32	0.64	0.33	0.74	0.79	0.77	0.56	0.35	0.48	0.64
Hydropsychinae/Trichoptera	0.82	0.69	0.23	0.58	0.86	0.87	0.10	0.75	0.08	0.40	0.16	0.13	0.34	0.74	0.43	0.48
Baetidae/Ephemeroptera	0.97	0.64	0.12	0.92	0.90	0.53	0.88	0.83	0.92	0.82	0.65	0.88	0.78	0.93	0.98	0.78
Biotic index	3.7	4.1	5.2	4.5	4.8	4.2	4.2	4.0	4.2	4.1	3.4	3.6	4.2	4.4	4.6	4.2
% Filterer	20	20	9	20	26	49	34	40	21	39	38	33	32	24	36	29
Density	122	277	255	620	486	581	492	759	441	526	349	415	566	1848	905	576
EPT richness	10	11	13	13	13	14	12	15	13	18	18	21	23	20	21	16
Metals Tolerance index	4.5	5.1	3.8	5.2	5.6	4.9	4.5	4.1	4.3	4.4	3.8	3.7	4.2	3.5	3.7	4.3
<b>Metric scores</b>																
Taxa richness	1	2	3	3	3	4	4	4	4	4	4	5	5	6	6	4
Shannon diversity	5	6	6	6	6	6	5	6	6	6	6	6	6	6	6	6
EPT/EPTC	6	6	6	6	6	6	3	6	3	6	6	6	6	4	5	5
Hydropsychinae/Trichoptera	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Baetidae/Ephemeroptera	1	6	6	3	4	6	4	6	3	6	6	4	6	3	1	4
Biotic index	6	5	3	5	4	5	5	5	5	5	6	6	5	5	4	5
% Filterer	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Density (high)	*	*	*	6	*	6	*	6	*	*	*	*	6	6	6	6
Density (low)	1	3	3	6	5	6	5	6	4	5	3	4	6	6	6	5
EPT richness	3	3	3	3	3	4	3	4	3	5	5	6	6	5	5	4
Metals Tolerance index	5	4	6	4	4	5	5	5	5	5	6	6	5	6	6	5
Total	40	47	48	54	47	60	46	60	45	54	54	55	63	59	57	53
Organic subset	12	11	9	17	10	17	11	17	11	11	12	12	17	17	16	13
Metals subset	9	10	12	13	12	15	13	15	12	15	14	16	17	17	17	14
<b>Bioassessment</b>																
Overall	67%	78%	80%	82%	78%	91%	77%	91%	75%	90%	90%	92%	95%	89%	86%	84%
Organic subset	100%	92%	75%	94%	83%	94%	92%	94%	92%	92%	100%	100%	94%	94%	89%	92%
Metals subset	50%	56%	67%	72%	67%	83%	72%	83%	67%	83%	78%	89%	94%	94%	94%	77%

\* not calculated if density is < 550

not sampled in 1992

**C-8. Mean metric values and bioassessment scores for Clark Fork River below Warm Springs Creek:  
Station 07 - August, 1986-2001 (4 Hess samples per year).**

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																	
Taxa richness	25	24	25	23	22	24	25	36	37	35	43	44	47	48	47	50	35
Shannon diversity	2.9	2.7	1.5	2.5	2.3	2.4	2.6	3.6	3.2	3.6	2.9	4.0	3.0	4.2	3.7	3.7	3.0
EPT/EPTC	0.97	0.95	0.98	0.93	0.91	0.94	0.94	0.61	0.85	0.64	0.83	0.60	0.86	0.63	0.61	0.73	0.81
Hydropsychinae/Trichopte	1.00	0.90	0.96	0.98	0.99	0.99	0.96	0.95	0.89	0.72	0.95	0.74	0.87	0.55	0.79	0.30	0.85
Baetidae/Ephemeroptera	1.00	1.00	1.00	1.00	0.99	0.86	1.00	0.46	0.90	0.80	0.84	0.26	0.45	0.15	0.65	0.44	0.74
Biotic index	4.7	4.7	4.1	4.7	5.0	4.8	4.9	5.2	4.5	5.0	4.9	4.6	4.6	4.6	4.8	5.0	4.8
% Filterer	65	64	81	58	75	62	54	25	41	27	57	27	62	16	30	30	48
Density	847	959	2874	1151	2402	1397	1353	852	2894	2152	2783	940	2439	1493	2269	2135	1809
EPT richness	10	10	11	10	11	11	12	15	15	16	20	22	22	21	21	22	15
Metals Tolerance index	5.0	5.0	4.9	5.0	5.2	5.3	5.0	4.6	4.6	5.6	5.1	5.4	4.8	4.9	4.6	4.5	5.0
<b>Metric scores</b>																	
Taxa richness	3	2	3	2	2	2	3	5	5	5	6	6	6	6	6	6	4
Shannon diversity	4	4	1	3	3	3	4	6	5	6	4	6	5	6	6	6	5
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichopte	0	4	2	1	1	1	2	2	4	6	2	6	5	6	6	6	3
Baetidae/Ephemeroptera	0	0	0	0	1	5	0	6	4	6	6	6	6	6	6	6	4
Biotic index	4	4	5	4	4	4	4	3	5	4	4	4	4	4	4	4	4
% Filterer	3	3	0	4	1	3	5	6	6	6	4	6	3	6	6	6	4
Density (high)	6	6	4	6	5	6	6	6	4	5	4	6	5	6	5	5	5
Density (low)	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
EPT richness	3	3	3	3	3	3	3	4	4	4	5	6	6	5	5	6	4
Metals Tolerance index	4	4	5	4	4	4	4	5	5	4	4	4	5	5	5	5	4
<b>Bioassessment</b>																	
Overall	59%	64%	53%	59%	55%	65%	65%	83%	82%	88%	77%	94%	86%	94%	92%	94%	76%
Organic subset	72%	72%	50%	78%	56%	72%	83%	83%	83%	83%	67%	89%	67%	89%	83%	83%	76%
Metals subset	72%	72%	78%	72%	72%	72%	72%	83%	83%	78%	83%	89%	94%	89%	89%	94%	81%

**C-9. Mean metric values and bioassessment scores for Clark Fork River at Dempsey:  
Station 08 - August, 1986-1992 and 1998-2001 (four Hess samples per year).**

	1986	1987	1988	1989	1990	1991	1992	1998	1999	2000	2001	Mean
<b>Metric values</b>												
Taxa richness	22	21	28	20	26	23	33	37	35	38	42	30
Shannon diversity	2.7	2.8	2.3	2.1	3.7	3.1	3.2	3.3	3.7	3.4	3.7	3.1
EPT/EPTC	0.99	0.84	0.82	0.90	0.86	0.84	0.94	0.76	0.77	0.92	0.87	0.86
Hydropsychinae/Trichop	0.98	0.95	0.95	0.96	0.83	0.93	0.65	0.80	0.87	0.79	0.65	0.85
Baetidae/Ephemeropteri	0.79	0.94	0.40	0.37	0.70	0.23	0.81	0.75	0.20	0.89	0.41	0.59
Biotic index	4.6	5.1	4.6	5.0	4.8	4.7	5.1	5.1	4.8	4.6	5.0	4.8
% Filterer	59	57	56	68	36	27	37	52	43	42	46	48
Density	589	924	1981	1518	1335	460	1376	2624	1975	1101	1668	1414
EPT richness	10	10	12	9	12	13	17	19	18	20	20	14
Metals Tolerance index	4.9	5.7	5.2	4.8	5.1	5.1	4.8	5.2	4.7	4.7	4.8	5.0
<b>Metric scores</b>												
Taxa richness	2	2	3	2	3	2	4	5	5	5	6	4
Shannon diversity	4	4	3	2	6	5	5	5	6	6	6	5
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichop	1	2	2	2	6	3	6	6	5	6	6	4
Baetidae/Ephemeropteri	6	2	6	6	6	6	6	6	6	4	6	5
Biotic index	4	4	4	4	4	4	4	4	4	4	4	4
% Filterer	4	4	4	2	6	6	6	5	6	6	6	5
Density (high)	6	6	6	6	6	*	6	4	6	6	6	6
Density (low)	6	6	6	6	6	5	6	6	6	6	6	6
EPT richness	3	3	3	2	3	3	4	5	5	5	5	4
Metals Tolerance index	5	4	4	5	4	4	5	4	5	5	5	5
Total	47	43	47	43	56	44	58	56	60	59	62	53
Organic subset	14	14	14	12	16	10	16	13	16	16	16	15
Metals subset	14	13	13	13	13	12	15	15	16	16	16	14
<b>Bioassessment</b>												
Overall	71%	65%	71%	65%	85%	73%	88%	85%	91%	89%	94%	80%
Organic subset	78%	78%	78%	67%	89%	83%	89%	72%	89%	89%	89%	82%
Metals subset	78%	72%	72%	72%	72%	67%	83%	83%	89%	89%	89%	79%

\* not calculated if density is < 550.

**C-10. Mean metric values and bioassessment scores for Clark Fork River at Sager Lane:  
Station 08.5 - August, 1990-1992 and 1998-2001 (4 Hess samples per year).**

	1990	1991	1992	1998	1999	2000	2001	Mean
<b>Metric values</b>								
Taxa richness	26	28	35	36	38	43	39	35
Shannon diversity	3.6	3.6	3.5	3.5	3.7	3.5	3.7	3.6
EPT/EPTC	0.74	0.80	0.70	0.84	0.70	0.92	0.83	0.79
Hydropsychinae/Trichoptera	0.78	0.60	0.35	0.72	0.73	0.65	0.85	0.67
Baetidae/Ephemeroptera	0.56	0.43	0.34	0.84	0.17	0.74	0.48	0.51
Biotic index	4.8	4.6	5.2	4.9	5.0	5.0	4.8	4.9
% Filterer	22	18	9	44	32	45	49	31
Density	1282	840	1155	1372	2380	2956	2019	1715
EPT richness	14	15	17	19	16	21	19	17
Metals Tolerance index	4.9	4.7	4.8	5.0	4.7	4.6	5.0	4.8
<b>Metric scores</b>								
Taxa richness	3	3	5	5	5	6	5	5
Shannon diversity	6	6	6	6	6	6	6	6
EPT/EPTC	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	6	6	6	6	6	6	5	6
Baetidae/Ephemeroptera	6	6	6	6	6	6	6	6
Biotic index	4	4	3	4	4	4	4	4
% Filterer	6	6	6	6	6	6	6	6
Density (high)	6	6	6	6	5	4	5	5
Density (low)	6	6	6	6	6	6	6	6
EPT richness	4	4	4	5	4	5	5	4
Metals Tolerance index	5	5	5	4	5	5	4	5
Total	58	58	59	60	59	60	58	59
Organic subset	16	16	15	16	15	14	15	15
Metals subset	15	15	15	15	15	16	15	15
<b>Bioassessment</b>								
Overall	88%	88%	89%	91%	89%	91%	88%	89%
Organic subset	89%	89%	83%	89%	83%	78%	83%	85%
Metals subset	83%	83%	83%	83%	83%	89%	83%	84%

**C-11. Mean metric values and bioassessment scores for Clark Fork River at Deer Lodge:  
Station 09 - August, 1986-2001 (4 Hess samples per year).**

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																	
Taxa richness	24	28	26	32	26	28	28	29	26	26	31	27	30	36	40	38	30
Shannon diversity	1.7	2.3	2.3	2.3	2.1	2.9	2.3	3.9	2.2	2.7	2.4	2.4	1.9	2.8	3.3	3.7	2.6
EPT/EPTC	0.98	0.94	0.77	0.87	0.94	0.91	0.94	0.81	0.95	0.71	0.89	0.87	0.91	0.75	0.83	0.82	0.87
Hydropsychinae/Trichoptera	1.00	0.95	0.99	0.93	0.96	0.70	0.99	0.73	0.99	0.96	0.98	0.98	0.99	0.96	0.92	0.69	0.92
Baetidae/Ephemeroptera	0.99	0.93	0.63	0.42	0.78	0.71	0.98	0.68	1.00	0.97	0.99	0.96	0.99	0.69	0.72	0.26	0.79
Biotic index	4.8	4.9	4.6	5.0	5.0	4.8	5.0	4.9	4.8	5.5	5.1	4.9	5.1	5.4	4.9	4.8	5.0
% Filterer	77	69	66	67	77	52	78	42	76	71	76	69	81	61	55	48	67
Density	1410	1555	3745	2150	3183	909	2283	569	2288	2135	3308	459	2825	3918	3856	2724	2332
EPT richness	10	14	11	15	13	15	12	13	11	12	16	13	15	15	19	16	14
Metals Tolerance index	4.9	5.1	5.5	4.9	5.0	4.7	5.3	4.8	5.1	5.8	5.3	5.2	5.4	5.4	5.0	5.1	5.1
<b>Metric scores</b>																	
Taxa richness	2	3	3	4	3	3	3	3	3	3	4	3	4	5	6	5	4
Shannon diversity	1	3	3	3	2	4	3	6	3	4	3	3	2	4	5	6	3
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	0	2	1	3	2	6	1	6	1	2	1	1	1	2	3	6	2
Baetidae/Ephemeroptera	1	3	6	6	6	6	1	6	0	1	1	2	1	6	6	6	4
Biotic index	4	4	4	4	4	4	4	4	4	3	4	4	4	3	4	4	4
% Filterer	0	2	2	2	0	5	0	6	0	1	0	2	0	3	5	6	2
Density (high)	6	6	3	5	4	6	5	6	5	5	3	*	4	2	2	4	4
Density (low)	6	6	6	6	6	6	6	6	6	6	6	5	6	6	6	6	6
EPT richness	3	4	3	4	3	4	3	3	3	3	4	3	4	4	5	4	4
Metals Tolerance index	5	4	4	5	4	5	4	5	4	4	4	4	4	4	4	4	4
<b>Bioassessment</b>																	
Overall	52%	65%	62%	73%	61%	83%	55%	86%	53%	58%	55%	55%	55%	68%	79%	86%	65%
Organic subset	56%	67%	50%	61%	44%	83%	50%	89%	50%	50%	39%	50%	44%	44%	61%	78%	58%
Metals subset	78%	78%	72%	83%	72%	83%	72%	78%	72%	72%	78%	67%	78%	78%	83%	78%	76%

\* not calculated if density is < 500

**C-12. Mean metric values and bioassessment scores for Clark Fork River above Little Blackfoot River:  
Station 10 - August, 1986-2001 (four Hess samples per year).**

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																	
Taxa richness	23	26	28	20	25	26	30	30	27	34	32	18	30	33	39	35	28
Shannon diversity	2.1	2.4	2.4	3.4	3.0	3.3	2.9	4.0	2.8	3.1	2.9	2.6	2.4	3.2	3.4	3.4	3.0
EPT/EPTC	0.92	0.91	0.62	0.83	0.77	0.91	0.92	0.81	0.91	0.65	0.91	0.83	0.92	0.83	0.80	0.82	0.84
Hydropsychinae/Trichoptera	0.99	0.94	0.81	0.53	0.73	0.44	0.95	0.60	0.93	0.94	0.93	0.92	0.94	0.87	0.93	0.90	0.83
Baetidae/Ephemeroptera	0.93	0.81	0.79	0.51	0.72	0.10	0.92	0.48	1.00	0.37	0.96	1.00	1.00	0.51	0.31	0.32	0.67
Biotic index	5.2	4.9	5.4	5.0	5.7	4.9	4.9	4.9	4.8	5.4	4.9	4.8	5.0	5.2	5.0	5.0	5.1
% Filterer	78	73	73	32	65	26	66	28	76	55	77	65	80	63	64	54	61
Density	3131	974	1688	448	1889	1615	1116	528	2388	3006	2045	195	1537	2580	2041	2077	1704
EPT richness	11	14	12	11	14	15	15	15	16	16	20	9	15	16	19	18	15
Metals Tolerance index	5.3	5.1	5.4	4.9	5.5	4.7	5.2	4.8	5.0	5.5	5.1	5.2	5.2	5.2	4.8	4.7	5.1
<b>Metric scores</b>																	
Taxa richness	2	3	3	2	3	3	4	4	3	4	4	1	4	4	5	5	3
Shannon diversity	2	3	3	6	5	5	4	6	4	5	4	4	3	5	6	6	4
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	1	2	6	6	6	6	2	6	3	2	3	3	2	5	3	4	4
Baetidae/Ephemeroptera	3	6	6	6	6	6	3	6	0	6	2	0	0	6	6	6	4
Biotic index	3	4	3	4	3	4	4	4	4	3	4	4	4	3	4	4	4
% Filterer	0	1	1	6	3	6	2	6	0	5	0	3	0	3	3	5	3
Density (high)	4	6	6	*	6	6	6	*	5	4	5	*	6	5	5	5	5
Density (low)	6	6	6	4	6	6	6	5	6	6	6	2	6	6	6	6	6
EPT richness	3	4	3	3	4	4	4	4	4	4	5	2	4	4	5	5	4
Metals Tolerance index	4	4	4	5	4	5	4	5	4	4	4	4	4	4	5	5	4
<b>Bioassessment</b>																	
Total	34	45	47	48	52	57	45	52	39	49	43	29	39	51	54	57	47
Organic subset	7	11	10	10	12	16	12	10	9	12	9	7	10	11	12	14	12
Metals subset	13	14	13	12	14	15	14	14	14	14	15	8	14	14	16	16	14
<b>Bioassessment</b>																	
Overall	52%	68%	71%	80%	79%	86%	68%	87%	59%	74%	65%	48%	59%	77%	82%	86%	71%
Organic subset	39%	61%	56%	83%	67%	89%	67%	83%	50%	67%	50%	58%	56%	61%	67%	78%	64%
Metals subset	72%	78%	72%	67%	78%	83%	78%	78%	78%	78%	83%	44%	78%	78%	89%	89%	76%

\* not calculated if density is < 550

**C-13. Mean metric values and bioassessment scores for Little Blackfoot River:  
Station 10.2 - August, 1993-2001 (4 Hess samples per year).**

	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>										
Taxa richness	40	42	41	39	33	36	43	46	42	40
Shannon diversity	3.9	4.2	4.2	3.9	4.2	4.1	4.4	4.0	3.7	4.1
EPT/EPTC	0.32	0.58	0.55	0.61	0.55	0.51	0.38	0.65	0.30	0.49
Hydropsychinae/Trichoptera	0.14	0.62	0.38	0.71	0.52	0.70	0.42	0.71	0.27	0.50
Baetidae/Ephemeroptera	0.30	0.88	0.57	0.48	0.60	0.56	0.53	0.88	0.25	0.56
Biotic index	4.3	4.1	4.4	4.0	4.1	4.3	4.2	4.4	4.7	4.3
% Filterer	10	40	31	53	42	42	28	34	26	34
Density	460	1413	906	799	274	350	678	1427	1234	838
EPT richness	20	22	22	20	18	19	22	24	21	21
Metals Tolerance index	3.3	4.4	4.4	4.3	3.8	4.0	3.4	4.2	3.8	4.0
<b>Metric scores</b>										
Taxa richness	6	6	6	5	4	5	6	6	6	6
Shannon diversity	6	6	6	6	6	6	6	6	6	6
EPT/EPTC	3	6	6	6	6	5	4	6	6	5
Hydropsychinae/Trichoptera	6	6	6	6	6	6	6	6	6	6
Baetidae/Ephemeroptera	6	4	6	6	6	6	6	4	6	6
Biotic index	5	5	5	5	5	5	5	5	4	5
% Filterer	6	6	6	5	6	6	6	6	6	6
Density (high)	*	6	6	6	*	*	6	6	6	6
Density (low)	5	6	6	6	3	4	6	6	6	5
EPT richness	5	6	6	5	5	5	6	6	5	5
Metals Tolerance index	6	5	5	5	6	5	6	5	6	5
Total	54	62	64	61	53	53	63	62	63	59
Organic subset	11	17	17	16	11	11	17	17	16	15
Metals subset	16	17	17	16	14	14	18	17	17	16
<b>Bioassessment</b>										
Overall	90%	94%	97%	92%	88%	88%	95%	94%	95%	93%
Organic subset	92%	94%	94%	89%	92%	92%	94%	94%	89%	92%
Metals subset	89%	94%	94%	89%	78%	78%	100%	94%	94%	90%

\* not calculated if density is < 550

**C-14. Mean metric values and bioassessment scores for Clark Fork River at Gold Creek Bridge:  
Station 11 - August, 1986-2001 (4 Hess samples per year).**

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																	
Taxa richness	29	30	35	32	25	34	37	39	39	37	32	24	37	35	44	44	34
Shannon diversity	3.3	2.9	3.8	2.9	3.2	3.6	3.4	4.3	3.6	3.6	3.5	3.0	3.4	3.1	4.2	3.5	3.5
EPT/EPTC	0.87	0.83	0.80	0.93	0.93	0.86	0.63	0.79	0.75	0.73	0.86	0.92	0.86	0.79	0.73	0.90	0.82
Hydropsychinae/Trichoptera	0.76	0.79	0.93	0.23	0.90	0.56	0.54	0.58	0.83	0.90	0.82	0.86	0.87	0.71	0.75	0.59	0.73
Baetidae/Ephemeroptera	0.51	0.49	0.40	0.20	0.92	0.18	0.24	0.37	0.84	0.60	0.95	0.96	0.87	0.40	0.61	0.09	0.54
Biotic index	4.8	5.1	4.2	4.9	5.2	5.0	5.9	4.8	4.5	5.0	4.4	4.3	4.8	5.1	4.7	4.5	4.8
% Filterer	42	63	41	23	68	34	47	31	54	53	62	76	56	51	35	19	47
Density	838	1073	396	965	457	1446	1781	558	1265	906	509	398	909	1390	1426	1267	974
EPT richness	15	17	18	18	13	19	17	21	24	19	19	13	20	18	22	21	18
Metals Tolerance Index	4.8	5.3	4.4	4.6	5.5	5.1	5.5	4.6	4.5	5.0	4.5	4.6	4.9	5.0	4.3	4.2	4.8
<b>Metric scores</b>																	
Taxa richness	3	4	5	4	3	4	4	5	5	5	4	2	5	5	6	6	4
Shannon diversity	5	4	6	4	5	6	6	6	6	6	6	5	6	5	6	6	6
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	6	6	3	6	4	6	6	6	6	4	6	5	5	6	6	6	5
Baetidae/Ephemeroptera	6	6	6	6	3	6	6	6	6	6	2	2	5	6	6	6	5
Biotic index	4	4	5	4	3	4	2	5	5	4	5	5	4	4	4	5	4
% Filterer	6	3	6	6	2	6	6	6	5	5	3	0	4	5	6	6	5
Density (high)	6	6	*	6	*	6	6	6	6	6	*	*	6	6	6	6	6
Density (low)	6	6	4	6	5	6	6	6	6	6	5	4	6	6	6	6	6
EPT richness	4	4	5	5	3	5	4	5	6	5	5	3	5	5	6	5	5
Metals Tolerance index	5	4	5	5	4	4	4	5	5	4	5	5	5	4	5	5	5
<b>Bioassessment</b>																	
Overall	86%	80%	85%	88%	63%	89%	85%	94%	94%	86%	78%	62%	86%	88%	95%	95%	85%
Organic subset	89%	72%	92%	89%	42%	89%	78%	94%	89%	83%	67%	42%	78%	83%	89%	94%	79%
Metals subset	83%	78%	78%	89%	67%	83%	78%	89%	94%	83%	83%	67%	89%	83%	94%	89%	83%

\* not calculated if density is < 550

**C-15. Mean metric values and bioassessment scores for Flint Creek at New Chicago:  
Station 11.5 - August, 1993-2001 (four Hess samples per year).**

	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>										
Taxa richness	30	34	35	39	33	36	33	35	37	35
Shannon diversity	1.7	3.1	3.8	3.3	3.4	3.1	3.8	3.0	3.2	3.1
EPT/EPTC	0.92	0.88	0.71	0.87	0.89	0.74	0.73	0.77	0.83	0.82
Hydropsychinae/Trichoptera	0.05	0.71	0.50	0.86	0.60	0.26	0.68	0.30	0.30	0.47
Baetidae/Ephemeroptera	0.38	0.86	0.69	0.81	0.74	0.54	0.46	0.70	0.68	0.65
Biotic index	3.1	4.3	4.2	4.5	3.7	3.9	4.7	3.8	4.3	4.0
% Filterer	78	68	52	74	70	57	43	54	66	62
Density	1137	1665	1501	1731	827	964	393	1273	1101	1177
EPT richness	14	18	19	22	19	21	17	19	17	18
Metals Tolerance index	3.1	4.8	4.5	4.5	4.1	4.6	5.0	4.0	4.6	4.4
<b>Metric scores</b>										
Taxa richness	4	4	5	5	4	5	4	5	5	5
Shannon diversity	1	5	6	5	6	5	6	5	5	5
EPT/EPTC	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	6	6	6	5	6	6	6	6	6	6
Baetidae/Ephemeroptera	6	5	6	6	6	6	6	6	6	6
Biotic index	6	5	5	5	6	6	4	6	5	5
% Filterer	0	2	5	1	2	4	6	5	2	3
Density (high)	6	6	6	6	6	6	*	6	6	6
Density (low)	6	6	6	6	6	6	4	6	6	6
EPT richness	4	5	5	6	5	5	4	5	4	5
Metals Tolerance index	6	5	5	5	5	5	4	5	5	5
Total	51	55	61	56	58	60	50	61	56	56
Organic subset	12	13	16	12	14	16	10	17	13	14
Metals subset	16	16	16	17	16	16	12	16	15	16
<b>Bioassessment</b>										
Overall	77%	83%	92%	85%	88%	91%	83%	92%	85%	86%
Organic subset	67%	72%	89%	67%	78%	89%	83%	94%	72%	79%
Metals subset	89%	89%	89%	94%	89%	89%	67%	89%	83%	86%

\* not calculated if density is < 550

**C-16. Mean metric values and bioassessment scores for Clark Fork River at Bearmouth:  
Station 11.7 - August, 1993-2001 (4 Hess samples per year).**

	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>										
Taxa richness	44	39	35	31	23	34	42	41	44	37
Shannon diversity	3.7	2.9	2.6	2.9	2.6	3.1	4.0	2.7	3.5	3.1
EPT/EPTC	0.74	0.72	0.87	0.86	0.90	0.85	0.71	0.96	0.85	0.83
Hydropsychinae/Trichoptera	0.51	0.98	0.97	0.92	0.94	0.81	0.58	0.88	0.78	0.82
Baetidae/Ephemeroptera	0.18	0.92	0.74	0.96	0.97	0.90	0.60	0.80	0.15	0.69
Biotic index	5.1	5.2	5.0	4.8	4.7	4.9	4.8	4.9	5.2	4.9
% Filterer	14	61	74	69	73	52	34	75	30	54
Density	1808	3675	1809	1690	486	1043	2352	2771	2544	2020
EPT richness	20	22	19	17	13	19	22	22	20	19
Metals Tolerance index	4.7	5.0	5.0	4.9	4.9	4.9	4.2	4.6	4.6	4.7
<b>Metric scores</b>										
Taxa richness	6	5	5	4	2	4	6	6	6	5
Shannon diversity	6	4	4	4	4	5	6	4	6	5
EPT/EPTC	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	6	1	1	3	2	6	6	4	6	4
Baetidae/Ephemeroptera	6	3	6	2	1	4	6	6	6	4
Biotic index	4	3	4	4	4	4	4	4	3	4
% Filterer	6	3	1	2	1	5	6	1	6	3
Density (high)	6	3	6	6	*	6	5	4	5	5
Density (low)	6	6	6	6	5	6	6	6	6	6
EPT richness	5	6	5	4	3	5	6	6	5	5
Metals Tolerance index	5	4	4	5	5	5	5	5	5	5
Total	62	44	48	46	33	56	62	52	60	52
Organic subset	16	9	11	12	5	15	15	9	14	12
Metals subset	16	16	15	15	13	16	17	17	16	16
<b>Bioassessment</b>										
Overall	94%	67%	73%	70%	55%	85%	94%	79%	91%	79%
Organic subset	89%	50%	61%	67%	42%	83%	83%	50%	78%	67%
Metals subset	89%	89%	83%	83%	72%	89%	94%	94%	89%	87%

\* not calculated if <550

**C-17. Mean metric values and bioassessment scores for Clark Fork River at Bonita:  
Station 12 - August, 1986-2001 (4 Hess samples per year).**

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																	
Taxa richness	26	34	31	29	23	37	34	34	30	34	31	24	32	43	36	47	33
Shannon diversity	2.2	3.1	2.4	3.0	2.3	2.2	2.5	3.4	2.9	2.8	2.8	2.8	2.7	3.6	2.3	3.8	2.8
EPT/EPTC	0.95	0.64	0.76	0.83	0.91	0.91	0.85	0.84	0.80	0.87	0.82	0.91	0.91	0.91	0.95	0.84	0.86
Hydropsychinae/Trichopter	0.97	0.96	0.99	0.83	0.95	0.95	0.98	0.73	0.93	0.95	0.94	0.96	0.90	0.72	0.96	0.75	0.90
Baetidae/Ephemeroptera	0.94	0.48	0.90	0.88	0.92	0.91	0.98	0.17	0.87	0.69	0.96	0.96	0.91	0.38	0.57	0.13	0.73
Biotic index	4.7	5.1	4.7	5.2	5.0	5.0	5.2	4.7	4.8	4.8	4.9	4.5	4.7	4.4	4.9	4.9	4.9
% Filterer	63	52	69	60	72	74	67	33	64	68	65	67	64	43	80	36	61
Density	949	1228	8080	2227	1245	3153	3559	701	1926	1127	1338	293	763	1578	3482	2264	2120
EPT richness	13	16	15	15	13	17	15	17	16	17	16	13	19	25	19	22	17
Metals Tolerance index	4.7	4.9	5.0	5.1	5.1	5.2	5.1	4.5	4.9	4.8	4.9	4.6	4.8	4.2	4.7	4.5	4.8
<b>Metric scores</b>																	
Taxa richness	3	4	4	3	2	5	4	4	4	4	4	2	4	6	5	6	4
Shannon diversity	3	5	3	5	3	3	3	6	4	4	4	4	4	6	3	6	4
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichopter	1	2	1	6	2	2	1	6	3	2	2	2	4	6	2	6	3
Baetidae/Ephemeroptera	2	6	4	4	3	3	1	6	5	6	2	2	3	6	6	6	4
Biotic index	4	4	4	3	4	4	3	4	4	4	4	5	4	5	4	4	4
% Filterer	3	5	2	4	1	1	2	6	3	2	3	2	3	6	0	6	3
Density (high)	6	6	0	5	6	4	3	6	6	6	6	*	6	6	3	5	5
Density (low)	6	6	6	6	6	6	6	6	6	6	6	3	6	6	6	6	6
EPT richness	3	4	4	4	3	4	4	4	4	4	4	3	5	6	5	6	4
Metals Tolerance index	5	5	4	4	4	4	4	5	5	5	5	5	5	5	5	5	5
<b>Bioassessment</b>																	
Total	42	53	38	50	40	42	37	59	50	49	46	34	50	64	45	62	48
Organic subset	13	15	6	12	11	9	8	16	13	12	13	7	13	17	7	15	12
Metals subset	14	15	14	14	13	14	14	15	15	15	15	11	16	17	16	17	15
<b>Bioassessment</b>																	
Overall	64%	80%	58%	76%	61%	64%	56%	89%	76%	74%	70%	57%	76%	97%	68%	94%	72%
Organic subset	72%	83%	33%	67%	61%	50%	44%	89%	72%	67%	72%	58%	72%	94%	39%	83%	65%
Metals subset	78%	83%	78%	78%	72%	78%	78%	83%	83%	83%	83%	61%	89%	94%	89%	94%	82%

\* not calculated if <550

**C-18. Mean metric values and bioassessment scores for Rock Creek near Clinton:  
Station 12.5 - August, 1993-2001 (4 Hess samples per year).**

	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>										
Taxa richness	36	35	37	36	33	40	40	41	48	38
Shannon diversity	3.0	3.8	4.0	4.0	4.1	4.2	4.3	3.8	3.3	3.8
EPT/EPTC	0.28	0.48	0.60	0.63	0.73	0.61	0.39	0.44	0.40	0.51
Hydropsychinae/Trichoptera	0.18	0.54	0.27	0.35	0.37	0.28	0.27	0.50	0.13	0.32
Baetidae/Ephemeroptera	0.26	0.26	0.34	0.34	0.43	0.23	0.38	0.31	0.19	0.30
Biotic Index	3.8	3.6	3.6	3.6	3.3	3.4	4.5	3.8	3.6	3.7
% Filterer	10	17	20	29	23	25	13	19	28	20
Density	724	504	375	514	251	578	476	432	1134	554
EPT richness	20	20	21	21	21	21	22	23	24	21
Metals Tolerance index	2.4	2.7	3.0	3.1	2.9	3.5	4.3	2.8	3.0	3.1
<b>Metric scores</b>										
Taxa richness	5	5	5	5	4	6	6	6	6	5
Shannon diversity	5	6	6	6	6	6	6	6	5	6
EPT/EPTC	3	5	6	6	6	6	4	4	4	5
Hydropsychinae/Trichoptera	6	6	6	6	6	6	6	6	6	6
Baetidae/Ephemeroptera	6	6	6	6	6	6	6	6	6	6
Biotic index	6	6	6	6	6	6	5	6	6	6
% Filterer	6	6	6	6	6	6	6	6	6	6
Density (high)	6	*	*	*	*	6	*	*	6	6
Density (low)	6	5	4	5	3	6	5	4	6	5
EPT richness	5	5	5	5	5	5	6	6	6	5
Metals Tolerance index	6	6	6	6	6	6	5	6	6	6
Total	60	56	56	57	54	65	55	56	63	58
Organic subset	18	12	12	12	12	18	11	12	18	14
Metals subset	17	16	15	16	14	17	16	16	18	16
<b>Bioassessment</b>										
Overall	91%	93%	93%	95%	90%	98%	92%	93%	95%	94%
Organic subset	100%	100%	100%	100%	100%	100%	92%	100%	100%	99%
Metals subset	94%	89%	83%	89%	78%	94%	89%	89%	100%	90%

\* not calculated if density is < 550

**C-19. Mean metric values and bioassessment scores for Clark Fork River at Turah:  
Station 13 - August, 1986-2001 (4 Hess samples per year).**

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																	
Taxa richness	34	35	42	31	31	50	49	46	38	44	40	26	37	42	41	45	39
Shannon diversity	3.7	3.3	3.1	3.7	3.6	4.1	3.5	4.4	3.5	4.0	3.9	3.5	3.5	4.2	3.7	4.6	3.8
EPT/EPTC	0.63	0.81	0.80	0.77	0.61	0.63	0.72	0.76	0.73	0.68	0.80	0.92	0.89	0.66	0.79	0.71	0.74
Hydropsychinae/Trichoptera	0.81	0.92	0.96	0.85	0.54	0.75	0.93	0.85	0.89	0.70	0.81	0.80	0.88	0.59	0.84	0.45	0.79
Baetidae/Ephemeroptera	0.40	0.68	0.83	0.48	0.22	0.40	0.87	0.34	0.59	0.53	0.55	0.50	0.51	0.22	0.25	0.29	0.48
Biotic index	4.8	4.7	4.4	4.7	5.1	5.0	4.8	4.0	4.3	4.9	4.3	3.8	4.2	4.2	4.2	4.5	4.5
% Filterer	44	68	65	50	27	34	56	22	51	44	57	54	54	25	57	29	46
Density	1539	1708	5636	1725	2145	2164	2757	483	1078	1941	1354	226	674	1111	1454	1128	1695
EPT richness	17	19	23	17	16	26	26	26	20	25	23	17	22	25	22	26	22
Metals Tolerance index	5.0	4.8	4.8	4.6	5.3	5.1	4.7	3.5	4.2	5.2	4.2	4.0	4.3	3.9	4.2	4.1	4.5
<b>Metric scores</b>																	
Taxa richness	4	5	6	4	4	6	6	6	5	6	6	3	5	6	6	6	5
Shannon diversity	6	5	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	6	3	2	5	6	6	3	5	4	6	6	6	4	6	6	6	5
Baetidae/Ephemeroptera	6	6	6	6	6	6	5	6	6	6	6	6	6	6	6	6	6
Biotic index	4	4	5	4	4	4	4	5	5	4	5	6	5	5	5	5	5
% Filterer	6	2	3	6	6	6	4	6	5	6	4	5	5	6	4	6	5
Density (high)	6	6	0	6	5	5	4	*	6	6	6	*	6	6	6	6	5
Density (low)	6	6	6	6	6	6	6	5	6	6	6	2	6	6	6	6	6
EPT richness	4	5	6	4	4	6	6	6	5	6	6	4	6	6	6	6	5
Metals Tolerance index	4	5	5	5	4	4	5	6	5	4	5	5	5	6	5	5	5
<b>Bioassessment</b>																	
Overall	88%	80%	76%	88%	86%	92%	83%	95%	89%	94%	94%	82%	91%	98%	94%	97%	89%
Organic subset	89%	67%	44%	89%	83%	83%	67%	92%	89%	89%	83%	92%	89%	94%	83%	94%	83%
Metals subset	78%	89%	94%	83%	78%	89%	94%	94%	89%	89%	94%	61%	94%	100%	94%	94%	89%

\* not calculated if <550

**C-20. Mean metric values and bioassessment scores for Blackfoot River at USGS:  
Station 14 - August, 1986-2000 (4 Hess samples per year).**

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																	
Taxa richness	21	31	36	28	31	30	41	37	39	42	35	32	36	35	41	40	35
Shannon diversity	4.0	3.3	4.0	4.0	4.1	4.1	2.8	3.9	4.0	3.6	3.9	3.6	3.9	4.2	3.0	2.8	3.7
EPT/EPTC	0.76	0.37	0.59	0.77	0.88	0.88	0.20	0.50	0.68	0.54	0.91	0.95	0.79	0.68	0.34	0.32	0.64
Hydropsychinae/Trichoptera	0.62	0.84	0.73	0.79	0.74	0.65	0.77	0.64	0.78	0.64	0.74	0.80	0.75	0.46	0.57	0.61	0.70
Baetidae/Ephemeroptera	0.49	0.49	0.71	0.37	0.28	0.47	0.50	0.41	0.44	0.35	0.75	0.67	0.32	0.29	0.22	0.29	0.44
Biotic index	3.4	4.8	4.8	3.7	3.5	3.6	4.4	4.1	4.0	3.7	3.7	3.9	3.5	3.5	4.0	3.8	3.9
% Filterer	19	17	32	42	45	30	7	19	37	26	55	66	51	30	16	20	32
Density	65	414	382	192	408	170	975	284	511	535	426	291	531	268	721	727	431
EPT richness	14	18	20	17	20	20	23	22	22	24	21	19	24	21	24	21	21
Metals Tolerance index	3.0	2.9	3.8	3.4	3.6	3.7	2.9	3.7	3.7	2.6	3.8	3.9	3.4	3.1	2.5	2.2	3.3
<b>Metric scores</b>																	
Taxa richness	2	4	5	3	4	4	6	5	5	6	5	4	5	5	6	6	5
Shannon diversity	6	5	6	6	6	6	4	6	6	6	6	6	6	6	5	4	6
EPT/EPTC	6	4	6	6	6	6	2	5	6	5	6	6	6	6	3	3	5
Hydropsychinae/Trichoptera	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Baetidae/Ephemeroptera	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Biotic index	6	4	4	6	6	6	5	5	6	6	6	6	6	6	5	6	6
% Filterer	6	6	6	6	6	6	6	6	6	6	5	2	5	6	6	6	6
Density (high)	*	*	*	*	*	*	6	*	*	*	*	*	*	*	6	6	6
Density (low)	1	4	4	2	4	2	6	3	5	5	4	3	5	3	6	6	4
EPT richness	4	5	5	4	5	5	6	6	6	6	5	5	6	5	6	5	5
Metals Tolerance Index	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
<b>Bioassessment</b>																	
Overall	82%	83%	90%	85%	92%	88%	89%	90%	95%	97%	92%	83%	95%	92%	92%	91%	90%
Organic subset	100%	83%	83%	100%	100%	100%	94%	92%	92%	100%	92%	67%	92%	100%	94%	100%	93%
Metals subset	61%	83%	83%	67%	83%	72%	100%	83%	94%	94%	83%	78%	94%	78%	100%	94%	84%

\* not calculated if density is < 550

C-21. Mean metric values and bioassessment scores for Clark Fork River above Missoula:

Station 15.5 - August, 1989-2001 (4 Hess samples per year).

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>														
Taxa richness	29	25	32	39	36	37	47	38	29	36	36	43	45	36
Shannon diversity	3.4	2.8	3.2	3.7	4.0	3.5	3.5	3.6	2.9	3.1	4.2	3.9	4.0	3.5
EPT/EPTC	0.84	0.91	0.83	0.65	0.85	0.76	0.88	0.92	0.95	0.92	0.84	0.54	0.31	0.78
Hydropsychinae/Trichoptera	0.86	0.92	0.94	0.89	0.90	0.97	0.95	0.93	0.95	0.91	0.56	0.88	0.41	0.85
Baetidae/Ephemeroptera	0.71	0.51	0.82	0.96	0.30	0.66	0.40	0.57	0.44	0.65	0.28	0.55	0.25	0.55
Biotic index	4.3	4.1	4.5	5.0	3.8	4.6	4.3	4.3	4.3	4.3	3.8	4.9	5.1	4.4
% Filterer	67	79	64	53	48	58	67	66	79	75	49	38	11	58
Density	341	468	560	1841	384	1292	2090	795	631	1257	411	1646	2145	1066
EPT richness	18	16	16	21	21	20	27	23	17	22	22	22	18	20
Metals Tolerance index	4.3	4.0	4.6	5.2	3.4	4.7	4.3	4.3	4.4	4.4	3.8	4.4	4.2	4.3
<b>Metric scores</b>														
Taxa richness	3	3	4	5	5	5	6	5	3	5	5	6	6	5
Shannon diversity	6	4	5	6	6	6	6	6	4	5	6	6	6	6
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	5	3	6
Hydropsychinae/Trichoptera	5	3	2	4	4	1	2	3	2	3	6	4	6	3
Baetidae/Ephemeroptera	6	6	6	2	6	6	6	6	6	6	6	6	6	6
Biotic index	5	5	5	4	6	4	5	5	5	5	6	4	4	5
% Filterer	2	0	3	5	6	4	2	2	0	1	6	6	6	3
Density (high)	*	*	6	6	*	6	5	6	6	6	*	6	5	6
Density (low)	3	5	6	6	4	6	6	6	6	6	4	6	6	5
EPT richness	5	4	4	5	5	5	6	6	4	6	6	6	5	5
Metals Tolerance index	5	5	5	4	6	5	5	5	5	5	6	5	5	5
Total	46	41	52	53	54	54	55	56	47	54	57	60	58	55
Organic subset	7	5	14	15	12	14	12	13	11	12	12	16	15	14
Metals subset	13	14	15	15	15	16	17	17	15	17	16	17	16	16
<b>Bioassessment</b>														
Overall	77%	68%	79%	80%	90%	82%	83%	85%	71%	82%	95%	91%	88%	82%
Organic subset	58%	42%	78%	83%	100%	78%	67%	72%	61%	67%	100%	89%	83%	75%
Metals subset	72%	78%	83%	83%	83%	89%	94%	94%	83%	94%	89%	94%	89%	87%

\* not calculated if density is < 550

**C-22. Mean metric values and bioassessment scores for Clark Fork River at Shuffields:**

**Station 18 - August, 1986-2001 (4 Hess samples per year).**

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																	
Taxa richness	29	38	34	27	30	34	38	45	39	42	39	32	39	42	43	45	37
Shannon diversity	2.9	4.0	3.2	3.5	3.5	3.6	2.9	4.0	3.1	3.8	3.6	3.4	2.7	3.7	3.4	4.0	3.5
EPT/EPTC	0.90	0.79	0.90	0.82	0.86	0.75	0.91	0.70	0.84	0.60	0.90	0.86	0.31	0.77	0.83	0.74	0.78
Hydropsychinae/Trichoptera	0.96	0.75	0.71	0.92	0.73	0.81	0.83	0.73	0.92	0.81	0.85	0.86	0.75	0.37	0.86	0.76	0.79
Baetidae/Ephemeroptera	0.80	0.93	0.72	0.50	0.67	0.53	0.67	0.59	0.60	0.77	0.66	0.30	0.40	0.40	0.56	0.35	0.59
Biotic index	4.3	4.8	4.1	4.5	4.3	4.5	4.7	4.6	4.8	5.1	4.2	4.3	6.2	5.1	4.7	4.6	4.7
% Filterer	73	43	48	63	67	54	72	24	73	35	71	71	18	26	65	53	54
Density	584	1052	1360	830	932	627	1543	848	1725	1992	706	353	1943	1271	2029	1534	1208
EPT richness	16	20	18	16	19	19	22	22	22	25	19	21	23	24	23		21
Metals Tolerance index	4.2	4.6	4.7	4.5	4.2	4.7	4.4	4.6	4.7	5.3	4.1	4.1	6.9	4.4	4.5	4.4	4.6
<b>Metric scores</b>																	
Taxa richness	3	5	4	3	4	4	5	6	5	6	5	4	5	6	6	6	5
Shannon diversity	4	6	5	6	6	6	4	6	5	6	6	6	4	6	6	6	6
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	3	6	6	6	6
Hydropsychinae/Trichoptera	2	6	6	3	6	6	6	6	3	6	5	5	6	6	5	6	5
Baetidae/Ephemeroptera	6	3	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Biotic index	5	4	5	5	5	5	4	4	4	5	5	2	4	4	4	4	4
% Filterer	1	6	6	3	2	5	1	6	1	6	1	1	6	6	3	5	4
Density (high)	6	6	6	6	6	6	6	6	6	6	6	*	6	6	5	6	6
Density (low)	6	6	6	6	6	6	6	6	6	6	6	4	6	6	6	6	6
EPT richness	4	5	5	4	5	5	6	6	6	6	6	5	5	6	6	6	5
Metals Tolerance index	5	5	5	5	5	5	5	5	5	4	5	5	3	5	5	5	5
<b>Bioassessment</b>																	
Total	48	58	60	53	57	60	55	63	53	62	57	47	52	63	58	62	57
Organic subset	12	16	17	14	13	16	11	16	11	16	12	6	14	16	12	15	14
Metals subset	15	16	16	15	16	16	17	17	17	16	17	14	14	17	17	17	16
<b>Bioassessment</b>																	
Overall	73%	88%	91%	80%	86%	91%	83%	95%	80%	94%	86%	78%	79%	95%	88%	94%	86%
Organic subset	67%	89%	94%	78%	72%	89%	61%	89%	61%	89%	67%	50%	78%	89%	67%	83%	76%
Metals subset	83%	89%	89%	83%	89%	89%	94%	94%	94%	89%	94%	78%	78%	94%	94%	94%	89%

**C-23. Mean metric values and bioassessment scores for Bitterroot River near mouth:  
Station 19 - August, 1986-2001 (4 Hess samples per year).**

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																	
Taxa richness	31	35	39	33	30	36	34	37	29	41	34	36	39	36	36	39	35
Shannon diversity	3.5	3.7	3.4	3.8	3.5	3.8	3.1	4.3	2.9	3.9	3.3	3.6	3.6	4.0	4.7	3.9	3.7
EPT/EPTC	0.83	0.77	0.81	0.80	0.91	0.72	0.68	0.73	0.78	0.81	0.91	0.92	0.87	0.84	0.72	0.79	0.81
Hydropsychinae/Trichoptera	0.96	0.91	0.96	0.73	0.83	0.89	0.92	0.73	0.90	0.68	0.82	0.71	0.83	0.44	0.86	0.78	0.81
Baetidae/Ephemeroptera	0.65	0.55	0.84	0.35	0.48	0.34	0.63	0.18	0.55	0.08	0.69	0.15	0.21	0.12	0.15	0.16	0.38
Biotic index	4.7	4.8	4.6	4.2	4.4	4.6	4.9	4.0	4.7	4.0	4.3	4.0	4.4	3.6	4.7	4.3	4.4
% Filterer	65	63	63	58	66	56	69	35	81	45	70	64	56	46	68	45	59
Density	890	1085	1243	792	936	810	1421	334	1870	938	1055	461	1242	425	874	679	941
EPT richness	16	20	21	19	17	18	18	21	14	22	18	18	22	20	20	20	19
Metals Tolerance index	4.7	4.4	4.8	3.8	4.4	4.9	4.7	3.1	4.6	3.9	4.4	4.1	4.3	3.7	3.9	4.0	4.2
<b>Metric scores</b>																	
Taxa richness	4	5	5	4	4	5	4	5	3	6	4	5	5	5	5	5	5
Shannon diversity	6	6	6	6	6	6	5	6	4	6	5	6	6	6	6	6	6
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	2	3	2	6	6	4	3	6	4	6	6	6	6	6	5	6	5
Baetidae/Ephemeroptera	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Biotic index	4	4	4	5	5	4	4	5	4	5	5	5	5	6	4	5	5
% Filterer	3	3	3	4	2	4	2	6	0	6	2	3	4	6	2	6	4
Density (high)	6	6	6	6	6	6	6	*	6	6	6	*	6	*	6	6	6
Density (low)	6	6	6	6	6	6	6	3	6	6	6	5	6	4	6	6	6
EPT richness	4	5	5	5	4	5	5	5	4	6	5	5	6	5	5	5	5
Metals Tolerance index	5	5	5	6	5	5	5	6	5	6	5	5	5	6	6	5	5
Total	52	55	54	60	56	57	52	54	48	65	56	52	61	56	57	62	57
Organic subset	13	13	13	15	13	14	12	11	10	17	13	8	15	12	12	17	14
Metals subset	15	16	16	17	15	16	16	14	15	18	16	15	17	15	17	16	16
<b>Bioassessment</b>																	
Overall	79%	83%	82%	91%	85%	86%	79%	90%	73%	98%	85%	87%	92%	93%	86%	94%	85%
Organic subset	72%	72%	72%	83%	72%	78%	67%	92%	56%	94%	72%	67%	83%	100%	67%	94%	75%
Metals subset	83%	89%	89%	94%	83%	89%	89%	78%	83%	100%	89%	83%	94%	83%	94%	89%	88%

\* not calculated if < 550

**C-24. Mean metric values and bioassessment scores for Clark Fork River  
at Harper Bridge: Station 20, August, 1986-2001 (4 Hess samples per year).**

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																	
Taxa richness	28	33	31	29	28	32	39	31	31	41	33	31	36	37	44	41	34
Shannon diversity	2.9	3.2	2.5	3.5	3.1	3.3	3.2	1.4	3.2	3.1	2.9	3.6	2.4	4.2	4.0	3.8	3.1
EPT/EPTC	0.92	0.76	0.84	0.59	0.74	0.78	0.53	0.81	0.77	0.78	0.90	0.91	0.86	0.72	0.58	0.76	0.77
Hydropsychinae/Trichopte	0.95	0.92	0.98	0.93	0.96	0.93	0.93	0.98	0.90	0.91	0.93	0.80	0.94	0.55	0.81	0.78	0.89
Baetidae/Ephemeroptera	0.86	0.84	0.85	0.66	0.72	0.62	0.83	0.75	0.68	0.43	0.77	0.40	0.39	0.28	0.19	0.08	0.58
Biotic index	4.7	4.9	4.5	5.4	5.2	4.7	5.4	4.9	4.7	4.9	4.6	4.0	4.8	4.5	4.9	4.5	4.8
% Filterer	68	68	74	52	64	61	47	90	67	63	71	62	74	42	34	20	60
Density	810	1519	4786	1391	1362	795	4369	4259	1658	2436	882	255	1594	364	999	836	1770
EPT richness	16	15	16	15	15	16	19	18	16	20	18	20	22	21	22	20	18
Metals Tolerance index	4.7	4.8	5.1	5.5	5.1	4.7	5.7	4.9	4.4	4.8	4.7	3.9	4.8	3.3	4.4	4.0	4.7
<b>Metric scores</b>																	
Taxa richness	3	4	4	3	3	4	5	4	4	6	4	4	5	5	6	6	4
Shannon diversity	4	5	3	6	5	5	5	1	5	5	4	6	3	6	6	6	5
EPT/EPTC	6	6	6	6	6	6	5	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichopte	2	3	1	3	2	3	3	1	4	3	3	6	2	6	6	6	3
Baetidae/Ephemeroptera	5	6	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Biotic index	4	4	5	3	3	4	3	4	4	4	4	5	4	5	4	5	4
% Filterer	2	2	1	5	3	3	6	0	2	3	1	3	1	6	6	6	3
Density (high)	6	6	1	6	6	6	2	2	6	5	6	*	6	*	6	6	5
Density (low)	6	6	6	6	6	6	6	6	6	6	6	3	6	4	6	6	6
EPT richness	4	4	4	4	4	4	5	5	4	5	5	5	6	5	6	5	5
Metals Tolerance index	5	5	4	4	4	5	4	5	5	5	5	6	5	6	5	5	5
Total	47	51	40	52	48	52	50	40	52	54	50	50	50	55	63	63	51
Organic subset	12	12	7	14	12	13	11	6	12	12	11	8	11	11	16	17	12
Metals subset	15	15	14	14	14	15	15	16	15	16	16	14	17	15	17	16	15
<b>Bioassessment</b>																	
Overall	71%	77%	61%	79%	73%	79%	76%	61%	79%	82%	76%	83%	76%	92%	95%	95%	78%
Organic subset	67%	67%	39%	78%	67%	72%	61%	33%	67%	67%	61%	67%	61%	92%	89%	94%	68%
Metals subset	83%	83%	78%	78%	78%	83%	83%	89%	83%	89%	89%	78%	94%	83%	94%	89%	85%

**C-25. Mean metric values and bioassessment scores for Clark Fork River at Huson: Station 22 - August, 1986-2001 (four Hess samples per year except eight samples in 1998).**

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																	
Taxa richness	28	42	33	32	30	33	40	32	29	31	27	20	33	33	n	44	32
Shannon diversity	2.5	3.4	2.8	3.9	3.7	2.7	3.3	3.0	2.5	2.9	3.4	3.0	3.1	4.0	o	4.1	3.2
EPT/EPTC	0.94	0.79	0.82	0.63	0.70	0.83	0.50	0.73	0.70	0.68	0.82	0.96	0.85	0.79		0.70	0.76
Hydropsychinae/Trichoptera	0.99	0.93	0.97	0.86	0.79	0.99	0.94	0.66	0.81	0.86	0.95	0.52	0.90	0.34		0.77	0.82
Baetidae/Ephemeroptera	0.94	0.40	0.81	0.45	0.29	0.78	0.87	0.47	0.59	0.47	0.70	0.68	0.53	0.19	d	0.15	0.55
Biotic index	4.8	4.9	4.6	4.9	4.3	4.8	5.3	4.6	4.6	4.7	4.8	3.2	4.6	4.5	a	4.7	4.6
% Filterer	75	60	71	43	40	71	57	57	77	70	58	42	55	23	t	27	55
Density	1396	1452	2680	819	516	882	2902	806	4296	1205	476	141	507	308	a	1054	1296
EPT richness	16	21	17	18	17	17	20	15	15	15	16	12	18	19		22	17
Metals Tolerance index	4.9	4.9	4.9	4.5	4.0	4.9	5.0	4.3	4.5	4.7	4.7	3.8	4.5	3.2		4.2	4.5
<b>Metric scores</b>																	
Taxa richness	3	6	4	4	4	4	6	4	3	4	3	2	4	4		6	4
Shannon diversity	3	6	4	6	6	4	5	5	3	4	6	5	5	6		6	5
EPT/EPTC	6	6	6	6	6	6	5	6	6	6	6	6	6	6		6	6
Hydropsychinae/Trichoptera	1	3	1	5	6	1	2	6	6	5	2	6	4	6		6	4
Baetidae/Ephemeroptera	2	6	6	6	6	6	5	6	6	6	6	6	6	6		6	6
Biotic index	4	4	4	4	5	4	3	4	4	4	4	6	4	5		4	4
% Filterer	1	4	1	6	6	1	4	4	0	2	4	6	5	6		6	4
Density (high)	6	6	4	6	*	6	4	6	2	6	*	*	*	*		6	5
Density (low)	6	6	6	6	5	6	6	6	6	5	1	5	3			6	5
EPT richness	4	5	4	5	4	4	5	4	4	4	4	3	5	5		6	4
Metals Tolerance index	5	5	5	5	5	5	4	5	5	5	5	6	5	6		5	5
<b>Bioassessment</b>																	
Overall	62%	86%	68%	89%	88%	71%	74%	85%	68%	79%	75%	78%	82%	88%		95%	79%
Organic subset	61%	78%	50%	89%	92%	61%	61%	78%	33%	67%	67%	100%	75%	92%		89%	73%
Metals subset	83%	89%	83%	89%	78%	83%	83%	83%	83%	83%	78%	56%	83%	78%		94%	82%

\* not calculated if density is < 550

**C-26. Mean metric values and bioassessment scores for Clark Fork River  
near Superior: Station 24 - August, 1986-2001 (four Hess samples per year).**

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																	
Taxa richness	31	34	36	28	33	33	44	34	28	35	28	24	35	35	36	36	33
Shannon diversity	3.5	3.5	3.3	2.8	3.8	3.8	3.7	3.9	3.1	3.3	2.7	2.6	2.9	3.6	3.6	3.5	3.3
EPT/EPTC	0.84	0.76	0.80	0.84	0.81	0.83	0.70	0.65	0.82	0.83	0.94	0.95	0.91	0.84	0.82	0.84	0.82
Hydropsychinae/Trichoptera	0.73	0.96	0.97	0.91	0.86	0.90	0.90	0.86	0.93	0.77	0.91	0.92	0.91	0.78	0.85	0.81	0.87
Baetidae/Ephemeroptera	0.80	0.54	0.61	0.42	0.53	0.70	0.19	0.36	0.58	0.21	0.60	0.71	0.44	0.33	0.17	0.36	0.47
Biotic index	4.4	5.0	4.7	4.8	4.6	4.5	4.9	4.4	4.5	4.1	4.5	4.3	4.7	4.3	4.2	4.3	4.5
% Filterer	55	61	61	74	56	54	49	53	74	64	78	84	75	59	58	59	63
Density	537	1100	2738	1088	725	463	955	975	2084	1102	873	843	848	757	929	1174	1074
EPT richness	18	17	20	17	22	19	26	18	16	20	15	14	22	22	24	21	19
Metals Tolerance index	3.9	4.6	4.4	4.7	4.4	4.7	4.6	4.0	4.5	3.9	4.6	4.3	4.8	4.2	3.9	4.1	4.3
<b>Metric scores</b>																	
Taxa richness	4	4	5	3	4	4	6	4	3	5	3	2	5	5	5	5	4
Shannon diversity	6	6	5	4	6	6	6	6	5	5	4	4	4	6	6	6	5
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	6	2	1	3	5	4	4	5	3	6	3	3	3	6	5	6	4
Baetidae/Ephemeroptera	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Biotic index	5	4	4	4	4	5	4	5	5	5	5	5	4	5	5	5	5
% Filterer	5	3	3	1	4	5	6	5	1	3	0	0	1	4	4	4	3
Density (high)	*	6	4	6	6	*	6	6	5	6	6	6	6	6	6	6	6
Density (low)	5	6	6	6	6	5	6	6	6	6	6	6	6	6	6	6	6
EPT richness	5	4	5	4	6	5	6	5	4	5	4	4	6	6	6	5	5
Metals Tolerance index	6	5	5	5	5	5	5	6	5	6	5	5	5	5	6	5	5
<b>Total</b>																	
Total	54	52	50	48	58	51	61	60	49	59	48	47	52	61	61	60	54
Organic subset	10	13	11	11	14	10	16	16	11	14	11	11	11	15	15	15	13
Metals subset	16	15	16	15	17	15	17	17	15	17	15	15	17	17	18	16	16
<b>Bioassessment</b>																	
Overall	90%	79%	76%	73%	88%	85%	92%	91%	74%	89%	73%	71%	79%	92%	92%	91%	83%
Organic subset	83%	72%	61%	61%	78%	83%	89%	89%	61%	78%	61%	61%	61%	83%	83%	83%	74%
Metals subset	89%	83%	89%	83%	94%	83%	94%	94%	83%	94%	83%	83%	94%	94%	100%	89%	90%

\* not calculated if density is < 550

**C-27. Mean metric values and bioassessment scores for Clark Fork River above the Flathead River:  
Station 25 - August, 1986-2001 (four Hess samples per year).**

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																	
Taxa richness	25	31	37	27	29	35	40	37	36	42	37	25	33	38	40	36	34
Shannon diversity	3.4	3.3	3.3	3.4	3.8	3.8	3.7	3.4	3.3	4.0	3.2	2.7	3.4	3.9	3.3	3.3	3.5
EPT/EPTC	0.79	0.66	0.66	0.61	0.58	0.71	0.64	0.55	0.46	0.70	0.66	0.69	0.81	0.67	0.56	0.53	0.64
Hydropsychinae/Trichoptera	0.70	0.90	0.96	0.98	0.91	0.96	0.91	0.95	0.91	0.76	0.95	0.93	0.78	0.77	0.87	0.85	0.88
Baetidae/Ephemeroptera	0.58	0.60	0.60	0.41	0.33	0.31	0.22	0.21	0.21	0.17	0.39	0.27	0.32	0.22	0.21	0.13	0.32
Biotic index	4.5	5.0	4.8	4.9	4.9	4.7	5.0	4.9	5.1	4.4	4.9	4.7	4.6	4.6	5.0	5.0	4.8
% Filterer	50	53	57	64	63	55	54	72	64	45	76	88	58	54	74	62	62
Density	249	1102	2097	1030	672	633	1355	684	1955	654	739	558	918	350	1054	1085	946
EPT richness	14	15	20	15	17	16	20	19	18	23	20	15	21	21	22	19	18
Metals Tolerance index	3.7	3.9	3.9	4.3	3.8	4.6	4.7	3.1	3.3	3.2	3.5	3.3	4.3	3.0	3.0	3.0	3.7
<b>Metric scores</b>																	
Taxa richness	3	4	5	3	3	5	6	5	5	6	5	3	4	5	6	5	5
Shannon diversity	6	5	5	6	6	6	6	6	5	6	5	4	6	6	5	5	6
EPT/EPTC	6	6	6	6	6	6	6	6	5	6	6	6	6	6	6	5	6
Hydropsychinae/Trichoptera	6	4	2	1	3	2	3	2	3	6	2	3	6	6	5	5	4
Baetidae/Ephemeroptera	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Biotic index	5	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4
% Filterer	6	5	4	3	3	5	5	1	3	6	0	0	4	5	1	3	3
Density (high)	*	6	5	6	6	6	6	6	6	6	6	6	6	*	6	6	6
Density (low)	2	6	6	6	6	6	6	6	6	6	6	6	6	4	6	6	6
EPT richness	4	4	5	4	4	4	5	5	5	6	5	4	5	5	6	5	5
Metals Tolerance index	6	6	6	5	6	5	5	6	6	6	6	6	5	6	6	6	6
Total	50	56	54	50	53	55	58	53	54	65	51	48	58	53	57	56	54
Organic subset	11	15	13	13	13	15	15	11	13	17	10	10	14	9	11	13	13
Metals subset	12	16	17	15	16	15	16	17	17	18	17	16	16	15	18	17	16
<b>Bioassessment</b>																	
Overall	83%	85%	82%	76%	80%	83%	88%	80%	82%	98%	77%	73%	88%	88%	86%	85%	83%
Organic subset	92%	83%	72%	72%	72%	83%	83%	61%	72%	94%	56%	56%	78%	75%	61%	72%	74%
Metals subset	67%	89%	94%	83%	89%	83%	89%	94%	94%	100%	94%	89%	89%	83%	100%	94%	90%

\* not calculated if density is < 550

**C-28. Mean metric values and bioassessment scores for Clark Fork River above Thompson Falls Reservoir:  
Station 27 - August, 1987-2001 (four Hess samples per year).**

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Mean
<b>Metric values</b>																
Taxa richness	26	26	21	29	31	23	27	25	25	n	24	26	34	24	34	27
Shannon diversity	2.9	2.8	2.6	2.9	2.9	2.7	3.0	2.8	2.7	o	4.0	3.4	3.9	3.1	3.2	3.1
EPT/EPTC	0.79	0.91	0.58	0.83	0.87	0.79	0.51	0.93	0.86		0.61	0.69	0.78	0.95	0.89	0.79
Hydropsychinae/Trichoptera	0.96	0.94	0.98	0.91	0.93	0.98	0.88	0.83	0.83	q	0.72	0.90	0.66	0.73	0.84	0.86
Baetidae/Ephemeroptera	0.34	0.31	0.24	0.54	0.37	0.04	0.22	0.09	0.31	u	0.21	0.17	0.32	0.02	0.18	0.24
Biotic index	5.2	5.0	5.3	4.8	4.7	5.1	5.3	4.2	4.4	a	5.1	5.2	4.5	4.0	4.6	4.8
% Filterer	67	78	75	76	69	73	66	64	71	l	33	45	51	51	53	62
Density	525	851	838	520	486	627	313	463	287	i	84	240	254	259	431	441
EPT richness	12	12	9	17	18	9	11	13	12	t	12	13	17	12	17	13
Metals Tolerance index	4.9	4.5	4.2	4.2	5.1	3.9	2.8	4.0	4.0	a	4.1	4.2	3.5	3.4	3.6	4.0
<b>Metric scores</b>																
Taxa richness	3	3	2	3	4	2	3	3	3	i						
Shannon diversity	4	4	4	4	4	4	5	4	4	v						
EPT/EPTC	6	6	6	6	6	6	5	6	6	e	2	3	4	2	4	3
Hydropsychinae/Trichoptera	2	2	1	3	3	1	4	6	6	d	6	6	6	6	6	6
Baetidae/Ephemeroptera	6	6	6	6	6	6	6	6	6	a	6	4	6	6	6	4
Biotic index	3	4	3	4	4	4	3	5	5	t	6	6	6	6	6	6
% Filterer	2	0	1	0	2	1	2	3	1	a	4	3	5	5	4	4
Density (high)	*	6	6	*	*	6	*	*	*		*	*	*	*	*	6
Density (low)	5	6	6	5	5	6	3	5	3		1	2	3	3	4	4
EPT richness	3	3	2	4	5	2	3	3	3		3	3	4	3	4	3
Metals Tolerance index	5	5	5	5	4	6	6	6	6		5	5	6	6	6	5
<b>Bioassessment</b>																
Overall	65%	68%	64%	67%	72%	67%	67%	78%	72%		75%	73%	85%	78%	83%	72%
Organic subset	42%	56%	56%	33%	50%	61%	42%	67%	50%		83%	75%	83%	83%	75%	61%
Metals subset	72%	78%	72%	78%	78%	78%	67%	78%	67%		50%	56%	72%	67%	78%	71%

\* not calculated if density is < 550

## **APPENDIX D:**

**RBP habitat assessment scores for Clark Fork Basin  
monitoring stations, 2001**

APPENDIX D. Clark Fork River Basin aquatic and riparian habitat data.

Habitat Assessment- MDEQ RBP Field Sheet																								
August, 4-8 2001 - Investigator: D. McGuire																								
metric	station	SF-1	0	1	2.5	4.5	5	6	7	8	8.5	9	10	10.2	11	11.5	11.7	12	12.5	13	14	15.5	18	19
Riffle Development			5	5	7	9		6	7	6	7	9	6	9	7	7	8	6	9	9	10	10	6	7
Benthic Substrate		5	6	5	6	7		6	6	5	6	8	5	9	4	8	6	7	9	9	9	10	9	9
Embeddedness		10	13	11	16	13		14	9	9	8	10	7	15	8	14	10	12	19	14	17	17	19	16
Channel Alteration		3	19	10	16	18		12	18	16	13	13	16	16	15	19	17	17	17	15	18	18	19	16
Sediment Deposition		7	10	6	13	14		14	14	10	12	12	10	17	11	12	13	14	16	15	17	14	15	18
Flow Status		16	18	16	16	16		17	15	11	12	16	16	16	16	17	17	17	17	16	14	11	14	16
Bank Stability		19	19	8	12	19		19	19	18	15	16	14	18	16	16	14	12	14	16	17	16	12	15
Bank Vegetation		19	16	3	8	18		14	20	18	13	15	14	18	14	13	17	12	15	14	13	14	17	16
Riparian Width		15	18	4	5	19		12	19	19	18	17	18	16	15	17	15	14	15	14	16	20	18	15
Total Score		94	124	68	99	133		114	127	112	104	116	106	134	106	123	117	111	131	122	131	130	129	128
% of max possible		59%	78%	43%	62%	83%		71%	79%	70%	65%	73%	66%	84%	66%	77%	73%	69%	82%	76%	82%	81%	81%	80%